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Dr. Gillette Hayden

and

Dr. Grace Rogers Spalding

for their pioneer efforts and
selfless devotion in behalf
of periodontia and the
American Academy
of Periodontology

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THE JOURNAL OF PERIODONTOLOGY is published to serve as the professional journal of periodontia; to keep dentists in touch with research being carried on in this field and related sciences; to stimulate greater interest in the supporting tissues of the teeth and their relation to oral and general health.

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Thirty-fifth Annual Meeting

THE AMERICAN ACADEMY OF PERIODONTOLOGY

October 11, 12, and 13, 1951

Washington, D. C.

Registration begins Wednesday, Oct. 10

Walter H. Scherer, D.D.S.

Dr. Walter H. Scherer, nationally respected periodontist of Houston, Texas, died May 12, 1951, after an active and successful professional career of 51 years. He helped organize the Houston Dental Society and was president in 1913, then was elected president of the Texas Dental Society, and in 1944 president of the American Dental Association.

Dr. Scherer served as president of the American Academy of Periodontology, and was active in this organization for many years. He also was on the faculty of the Texas Dental College for years, and was at one time president of its faculty and board of trustees. All of his many friends will endorse the resolution passed by the Texas Senate, which praised Dr. Scherer's accomplishments in his profession, and service to his state.

THE JOURNAL OF PERIODONTOLOGY

JULY, NINETEEN HUNDRED FIFTY-ONE

Muscular Force, Occlusion and Function as Etiologic Factors in Periodontal Disease

By MAX GRATZINGER, M.D., D.D.S., M.S., *Chicago, Illinois*

THE TRUE knowledge of the etiologic factors is of primary importance in every field of clinical science, since the removal of the cause constitutes the most essential part in therapy. This fact seems to have particular application to the periodontist who is primarily concerned with the treatment of periodontal diseases of chronic character. These diseases previously named in a somewhat collective manner "periodontoclasia" are periodontitis simplex, periodontosis and periodontitis complex.

In regard to the etiology of these diseases there seems to be common consent that not one but several factors are responsible for their existence. Those factors are the systemic factor and two local factors: (1) foreign matter: calculus, materia alba, chronic food impactions, and faulty restorations; (2) the effect of force, commonly known as periodontal trauma. The evaluation of the effect of systemic conditions in regard to these periodontal diseases is widely different in the opinion of the various investigators.[1, 2, 3, 4]

Clinical observation and experience seem to indicate that like every other disease, the periodontal involvements, of chronic character, are invariably influenced and overshadowed by the constitutional condition of the patient. This systemic factor which is predisposing in nature, in positive or negative sense, is the summation of all potentialities of systemic nature which govern the resistance of an individual against any adverse occurrence, and, therefore, may be called the "constitutional resistance." This term encompasses everything pertaining to the general health of the patient, as metabolism, nutrition, vitamin level, fluid balance, the integrity of the circulatory, respiratory, digestive, excretory, and inner-secretory system and many other points.

The existence of some systemic factor of this type has been widely recognized[4, 5] but the evaluation of it has been rather vague and indefinite. The diagram presented which was developed some years ago gives an interesting and revealing illustration of the effect of the constitutional resistance in regard to periodontal diseases and its etiologic evaluation. (Fig. one).

The sliding line indicates the level of the constitutional resistance from its highest point, presenting the stage of the ideal general health, to the lowest level which indicates the point just before death where the constitutional resistance has reached its possible minimum. The horizontal dotted line indicates the level

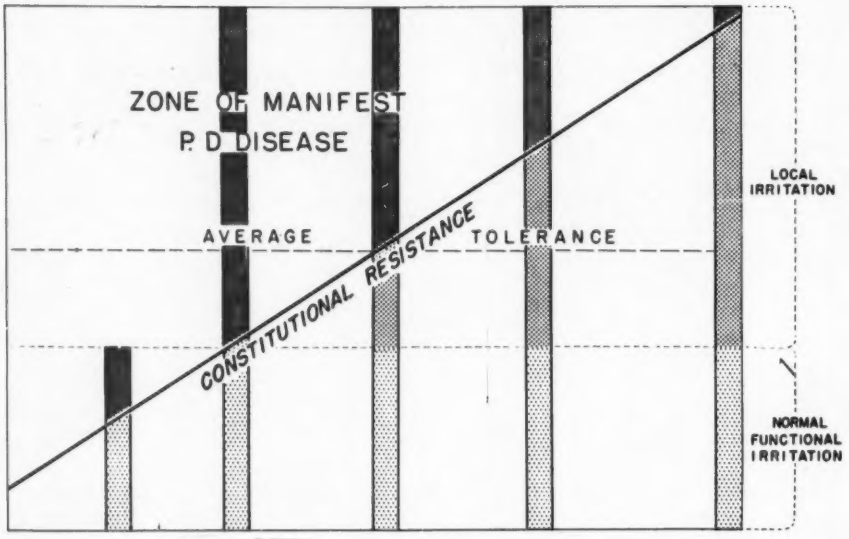

Fig. 1 Graphic illustration of the effect of the constitutional resistance in periodontal disease of chronic character.

of normal functional irritation, that is, the amount of irritation that is produced by the normal function of the masticatory apparatus, whereas the broken horizontal line represents the level of average tolerance. The columns above the dotted line indicate the amount of local irritation. The diagram illustrates that the individual of average constitutional resistance is able to compensate the normal functional irritation plus a certain amount of local irritation. Everything beyond that will become a disease producing agent. It shows that the individual in optimal health is able to compensate a much greater amount of local irritation without presenting any disease, while in a certain stage of lower resistance any amount of local irritation becomes disease producing. And, finally, it demonstrates that in cases where the resistance has been lowered to a danger point the normal functional irritation becomes a disease producing factor. This interpretation explains as well the curative effect of some therapeutic agents of systemic nature which improve the patient's constitutional resistance as the fact that in some cases which were in the stage of extreme exhaustion due to some consuming disease, periodontal conditions have been found which were diagnosed as periodontosis[6] but were nothing but the effect of the normal functional irritation acting against debilitated and helpless supporting structures.

The effect of matter and the pathogenesis of periodontitis simplex should be mentioned only briefly in order to contrast it to the effect of force. The effect of foreign bodies at the gingival margin produces gingivitis and its continuance periodontitis simplex.[7] The pathological sequelae are inflammation of the gingivae, resorption of the alveolar bone from the gingival side, proliferation of the epithelial attachment along the cementum towards the apex, and pocket formation. But the periodontal membrane below the epithelial attachment usually remains unaffected and the tooth, therefore, remains solid in its socket until a very late stage has been reached in which the leverage becomes so unfavorable that lateral force developed by normal function cannot be compensated

any more, thus creating what Box calls secondary periodontal trauma[8] which leads to the clinical picture of periodontitis complex.

The second local factor which is the topic of this presentation is force and the problem which it creates is known as "periodontal trauma." In whatever way one looks at this problem it is evident that force is the responsible agent which produces periodontal damage of a certain type. And it seems necessary, therefore, to discuss this force in regard to its quality and quantity, its source and introduction, its effect, and the means of its elimination. It seems to be an established fact that vertical force does not produce any periodontal damage; it is even necessary to be delivered in sufficient quantity in order to maintain the health of the tooth supporting apparatus.[9, 10] The situation in regard to lateral force, however, is very different. The tooth supporting apparatus is not capable of withstanding the continually repeated attacks of lateral force over a long period of time because of the peculiar suspension of the tooth by the principal fibers of the periodontal membrane. Vertical force is converted into pull and taken up by the majority of fibers symmetrically. Since these fibers are non-elastic but curled and have only a negligible elongation, no compression of the periodontal membrane results. Against lateral force a small number of fibers only is in resistance and areas of compression exist along a vertical line beginning at the alveolar crest and at the apex on the opposite side.

In regard to the quantity of force, it should be stated that it is not the magnitude of the lateral force that is the damage producing factor but the continuity of its action over a long period of time.

The next and perhaps most important point is the evaluation of the source of this force and how it is introduced. The intimate knowledge and complete understanding of this phase of the problem will greatly influence the diagnosis and it is directly connected with the therapeutic steps to be taken for the elimination of the damaging force.

The lateral force which causes periodontal damage can be produced in two, basically different ways: first, by the muscles of mastication, and secondly, by lack of balance within the retentive muscular apparatus, that is, the muscles of the tongue and the muscles of lips and cheeks.[11] The action of the force produced by the masticatory muscles is intermittent, while it is practically continuous if it derives from the pressure of the tongue.

Many years of clinical observation have resulted in the following arrangement of types of the introduction of lateral force to produce periodontal trauma.

Type I. Malposition of individual teeth, presenting:

a. bucço-lingual malocclusion producing a failure of proper occlusal contact
b. loss of contact point, and
c. subsequent change of axial inclination.

The loss of contact point due to malposition or due to the loss of the adjacent tooth eventually complicated by subsequent change of the axial inclination has to be considered as a serious impairment of the tooth supporting mechanism, which creates periodontal trauma, a fact which has been widely recognized and discussed in periodontal literature.

Type II. Overbite in Class I and Class II, Malocclusion and change of intermaxillary occlusion.

The more or less deep overbite which exists in some cases of Class I and almost invariably in Class II malocclusion present a predisposing situation which may lead to the generation of a great amount of lateral force in the anterior region. If the intermaxillary relationship remains stable it does not occur. But there is seemingly an inherent tendency of the mandible to move facially. And, therefore, a change in occlusion seems to take place by a forward movement of the mandible en masse which is so far only

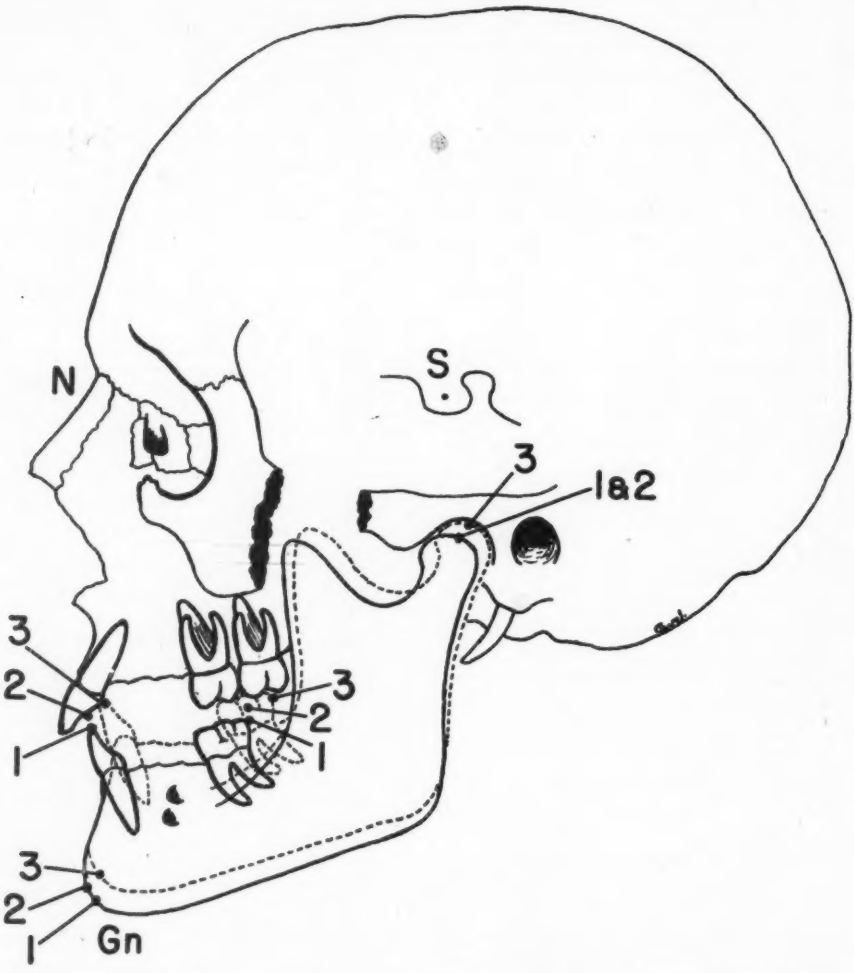

Fig. 2 Abnormal path of closure from rest position to occlusion. 1. Points on mandible at rest. 2. Points on mandible with incisors in contact. 3. Points on mandible at occlusion. (Courtesy Dr. J. R. Thompson)

a hypothetical assumption, but finds support in the fact that cases have been observed in which this forward movement led to the development of a Class III malocclusion. This forward movement of the mandible may be caused first by its forward swing due to wear in the molar and bicuspid region, without compensating elevation, secondly, due to some continuous growth, and third, by a primary dislocation of the mandible in retrusive position which one finds frequently in cases of deep overbite in Class I and Class II malocclusions. In some of these cases we find, according to Thompson, a characteristic behavior of the mandible on its way from physiologic rest-position into centric occlusion. (Fig. 2) Initial contact is first established in the anterior region and from here on the mandible is pushed backward into its retrusive posi-

tion creating considerable pressure in the contact area. The existence of damaging lateral force deriving from some change of the occlusion manifests itself clearly by the symptom that the upper anterior teeth are being moved during certain phases of occlusal contact and sometimes also in centric occlusion which easily can be diagnosed by putting the finger on top of those teeth while the patient performs masticatory movements. In this type of periodontal trauma wandering of the teeth involved may occur as a consequence of the driving force. Type I and Type II have two characteristics in common: they are intimately connected with the problem of occlusion and the damaging force is produced during the actual function of mastication as well as during other mandibular movements.

Type III. Bruxism or nervous habits of clamping and grinding.

The fact that nervous grinding habits, mostly in the stage of unconsciousness, during sleep, are responsible for periodontal damage had been first stated more than fifty years ago by the Viennese dentist, Dr. Karolyi, and has received since more or less consideration by those dealing with periodontal diseases.

The idea that periodontal trauma must be caused or connected with malocclusion or at least with cusp interference still left a great number of cases in the dark which presented perfect occlusion with excellent wear and no cusp interference. Excessive wear was asserted to be the damaging factor. But the real cause of the pathologic conditions found was the nightly activity of the mandible which had also created the excessive amount of wear.

In regard to the type of these involuntary movements there exists quite a number of hypothetical descriptions. Applegate has found by the use of the bite blocks which registered the nightly movements that those movements differ widely from the masticatory pattern. Contrary to the pattern of the masticatory movement the mandible seems to move in case of Bruxism predominantly in anterio-posterior direction, which finds its expression in the fact that the involved areas in cases of this type invariably are found at the mesial or distal side of the tooth involved. It is interesting to mention that the majority of the patients are not aware of their damaging habit.

In regard to the problem of bruxism, one has to understand that between an individual who sleeps in physiologic rest-position and the one who makes occlusal movements during sleep for a considerable period of time with force, there are many, many in-between stages. But every amount of mandibular activity which is also greatly influenced by the patient's position during sleep may find its expression in the patient's periodontal health.

Type IV. In cases of this type neither the muscles of mastication nor the occlusion play any important role. If the balance between the muscles of the tongue and the retentive power of the muscles of the lips and cheeks is impaired in favor of the tongue, an almost continuous lateral force will be exerted against the crown of the anterior teeth which are due to their position within the opening of the mouth in a very vulnerable situation. In such cases the first molars which are as old as the central incisors may be among the teeth which suffer first. This force is almost continuous and therefore leads to a very rapid and fast progressing disease which has been described as diffuse alveolar atrophy and is predominantly found in teen-agers or young adults of the female sex.

In regard to this problem, it may be said that the dentition after its eruption and after a certain positioning of the teeth has been reached does not remain stable unless the retentive apparatus consisting of the muscles of the tongue from the inside and of the muscles of lips and cheeks on the outside are in balance. This fact is being taught in the fundamentals of orthodontia. If the upper arches, for instance, are not supported by the tongue during the night as in the case of mouth breathing, the col-

lapse of the upper arch is invariably the consequence. One must keep in mind that the teeth of the human dentition are ready to move at any time as soon as they are exposed to continuous lateral force over a long period of time without being retained.

This grouping of the source of lateral force which may become the producer of "periodontal trauma" is definitely necessary to cast light into this highly complex problem. But it has to be understood that two or more of these four types of periodontal trauma are frequently combined in one case and a syndrome with periodontitis simplex may exist, a fact which accounts for the wide variety of the clinical picture of the traumatogenic periodontal involvements.

The next point to be discussed is the result of lateral force. The effect of lateral force has been described and evaluated with recognition of all the pertinent facts by McCall,[12] Box,[7] Leonard,[13] and lately by Goldman.[4] These men have stated that under the influence of "traumatic" or "traumatogenic occlusion" the pathogenesis is as follows: Vertical bone resorption at the lamina dura beginning at the alveolar crest as well as at the apex and changes in the periodontal membrane which lead, according to Box, to the loss of the organized principal fibers and formation of fibrous connective tissue. Clinically the consequence of the bone resorption is the widening of the periodontal membrane space in the roentgenogram and the loosening of the tooth involved. Wandering of the teeth may occur and if the process continues to go on, pocket formation follows very rapidly since principal fibers do not exist. But the gingivae remain primarily free of macroscopic inflammation since the damaging force cannot have any effect on soft tissue which is not compressed. It seems that the effect of traumatogenic force creates a pathogenesis which differs widely from that of periodontitis simplex and may therefore deserve to be considered as a pathological entity as Box planned when he created the term "periodontitis complex"[7]. Furthermore it is a conspicuous fact that the initial stage of periodontitis simplex as described by Box, and periodontosis have the same clinical symptoms and a very similar histopathology, but only further investigation of all pertinent factors in theory and practice will reveal where to draw the dividing line, or whether one exists at all.

After having discussed the quality and quantity of the force creating periodontal trauma, the different ways of its introduction and its effect, the point has been reached where the proper means of its elimination should be analyzed.

The therapeutic measures instituted for the relief of occlusal trauma differ correspondingly to the four different types which indicate the source and introduction of the damaging force.

In regard to type I were the malposition of the individual teeth is responsible, orthodontic treatment alone will result in perfect relief. If orthodontic treatment cannot be applied, equilibration by grinding, as taught by Schuyler[15] and Sorrin,[16] will bring some improvement and should be performed, so that the horizontal component of force will be eliminated to the greatest possible extent. The reconstruction of contact points by restorations is, of course, a measure which is self-evident. If some teeth have suffered considerable loss of alveolar bone due to malposition or loss of contact, the only way to prolong their life is the construction of a fixed splint, which unites at least three adjacent teeth to one solid unit by construction of MOD inlays or three-quarter crowns rigidly connected.

In cases of the second type where deep overbite is the necessary prerequisite for the existence of periodontal trauma, it is understood that no permanent improvement or cure can be accomplished if the overbite is not reduced to such extent that masticatory action is possible without contact in the anterior region. This fact has been recognized and grinding as well as the raising of the bite has been recommended. But neither grinding nor the creation of a new plane of occlusion by the construction of

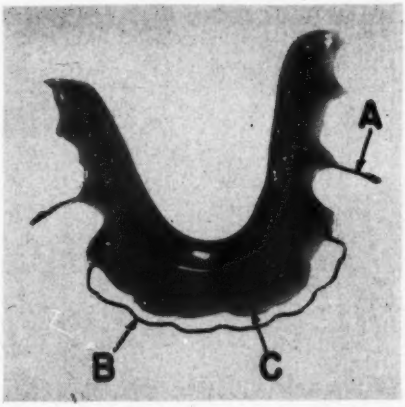

Fig. 3 Bite plate: a. Handles b. Labial wire c. Bite wall.

crowns and inlays or by splints is the solution of the problem for two reasons: first—the elongation of the clinical crown increases the leverage and is definitely contraindicated[13] since it is known that the crown should be as short as possible in relation to the length of the root. The other unfavorable aspect, which also renders the results of grinding ineffective, is the fact that the anterior teeth which have lost their occlusal stop will elevate until they contact each other again and, therefore, the primary condition will be re-established after some months have elapsed.

The capacity of the tooth to elevate if it is deprived of its occlusal stop[14] has brought an appliance into the picture which utilizes this unique feature and becomes a very effective instrument to raise the bite of the patient without elongation of the clinical crowns and keeps the situation which has been established in retention for an indefinite period of time. This appliance which periodontia adopts from orthodontia is the bite plate. The bite plate (Fig. 3) is a horseshoe shaped plate made of acrylic which does not need any retentive attachments, only two short handles to remove the appliance from the mouth. An anterior wire which secures the stability of the anterior teeth is a valuable but not essential adjunct, and if more retention is desired arrow clasps may be attached. From cuspid to cuspid there is the bite wall which should articulate with the lower six anterior teeth in such a way that they hit the bite plate at an angle of exactly 90° so that vertical force only will be exerted. The height of the bite plate should be such that some of the free way space, about 1½ to 2 mm., still should be available and may allow the patient to move into physiologic rest position and be without any strain. The effect of the bite plate consists in the elevation of the molars and bicuspids. It has to be worn day and night for a period of four to six months and is removed only during meals for mastication and for cleansing purposes. After some time has elapsed, the molars and later on the bicuspids, will occlude while there is free space between upper and lower anterior teeth. The limit to which the bite should be raised will have been reached when the normal masticatory excursions can be performed without injuring contact in the anterior region. The result thus obtained requires retention since otherwise the anterior teeth would elevate and the primary condition would be re-established. The bite plate itself is the proper appliance for this retention and has to be worn at night only in order to accomplish this purpose. An excellent illustration of the effect of the bite plate are these photographs of the study cast of a mandible before and after treatment which show elevation of molars, bicuspids without elongation of the clinical crown. The curve of Spee has flattened considerably. (Fig. 4).

To illustrate the clinical effect of this method of treatment an abstract of a case report is presented here. The case (Case 1) concerns a woman, 24 years of age, who has been suffering progressive loosening of the four upper incisor teeth for the past two years. The condition was diagnosed as periodontosis and various treatments have been applied without evidence of success. The patient presented a complete dentition. There was practically no formation of calculus, and a Class I malocclusion was present consisting of crowding of the anterior

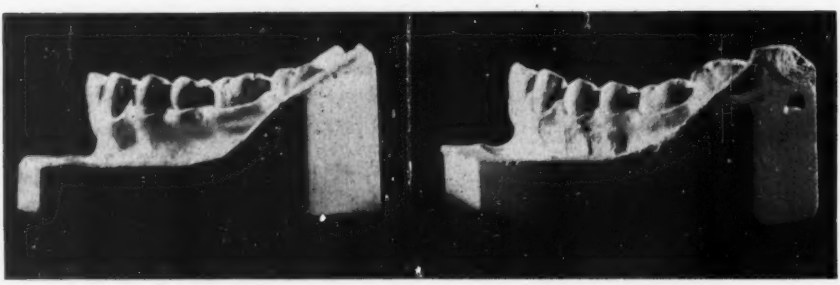

Fig. 4 Effect of bite plate therapy. Note: change of the curve of Spee, no elongation of the clinical crowns.

teeth and moderately deep overbite. (Fig. 5). The gingival tissue did not show any acute inflammation but pockets were present on the labial and lingual which suppurated slightly. The central incisors presented a considerable and the lateral incisors a lesser degree of mobility The roentgenogram (Fig. 6) reveals vertical alveolar resorption around the central incisors where the bone was reduced to almost a third of its original height. The rest of the dentition showed very little evidence of active periodontal disease. During masticatory movements the incisors were pushed out of their position. The case represents a typical picture in which the physiologic forward movement of the mandible is blocked by deep overbite which results in the trauma of the incisor teeth which receive an excessive amount of lateral stress during mastication and in centric occlusion. After symptomatical treatment which consisted in pocket elimination, the patient was equipped with a bite plate and wore the appliance for a period of five months, day and night except during meals and during cleansing periods. Within this time the molars and bicuspids elevated to such extent that the bite was opened 3 ml. in the incisor region (Fig. 7) and mandibular movements of any extent did not result in contact between the lower and upper anterior teeth. At the time when the proper relation of the anterior teeth was established the condition of all the teeth was somewhat improved. During the following year the condition improved markedly and has stayed at the same level for a period of almost ten years. (Figs. 8, 9.)

The question whether lack of contact in the anterior region corresponds to the requirements of the ideal occlusion has to be answered affirmatively, since it is frequently found in cases of ideal occlusion. The tongue position during physiologic rest on top of the lower incisors prevents these teeth from elevation into contact and represents, therefore, some kind of a bite plate provided by nature.

The third type in which the nightly activity of the mandible is responsible for the periodontal involvement has been sub-

Fig. 5 Study model of case before treatment was begun. (Case 1)

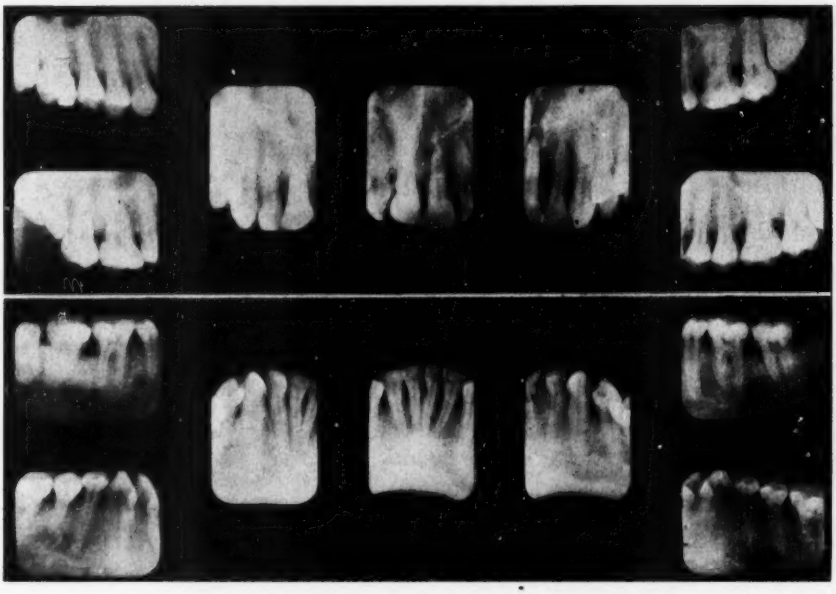

Fig. 6 Roentgenogram of case before treatment was begun.

ject to appliance therapy for more than five decades.

The most effective and satisfactory appliance for the elimination of bruxism seems to be the bite plate, which is worn for this purpose at night only. The advantage of this appliance compared with any other one used lies in the fact that all molars and bicuspids are completely at rest. They are all out of occlusion while the lower anterior front teeth receive an amount of vertical stress which proves to be very stimulating and beneficial for their periodontal health, even in cases where these teeth have suffered considerable loss of bone. The effect of this appliance is quite spectacular in regard to the mobility of the teeth which subsides to a great extent within a surprisingly short time. Since the mobility of a tooth does not find its expression in a roentgenogram, it may be said that the roentgenographic picture remains in the same stage as the case presented at the time when the treatment was begun even after a period of three or more years. But the results of the use of the bite plate in cases of bruxism has definitely cast some light onto the whole problem because it demonstrates the beneficial effect of a measure which eliminates every occlusal contact between the molars and bicuspids during the night.

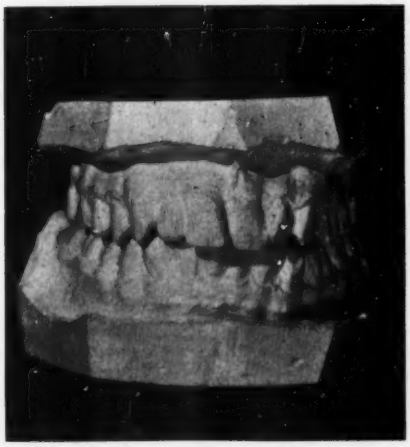

Fig. 7 Study model of case 1, 10 years after treatment was begun.

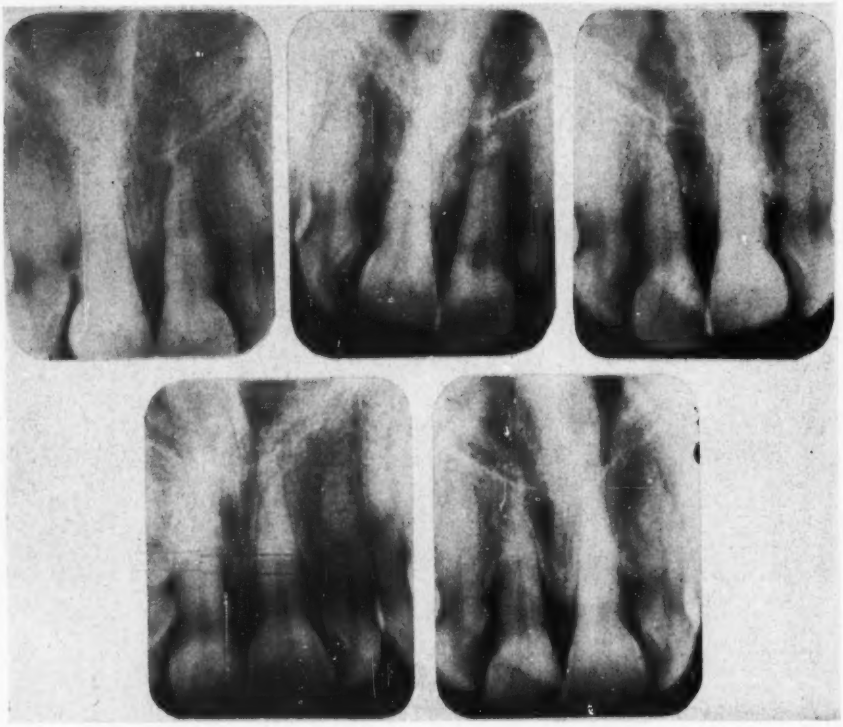

Fig. 8 Roentgenograms of the upper incisor region of Case 1, Feb. 1941, Oct. 1941, 1943, 1945, 1950.

From the effect thus obtained one can draw conclusions in regard to the extent of the nightly activity of the mandible and its effect. For this reason the bite plate should be used not only in cases of active bruxism of greater extent but also in cases where the tooth supporting bone has been considerably reduced due to periodontitis simplex in order to secure a period of complete rest for all teeth except the lower anterior teeth which receive beneficial stimulation. One has to visualize that repeated swallowing and the result of the different positions during sleep has definitely an effect upon the tooth supporting structures, and if these structures are weakened it seems to be mandatory to protect them during the night from every amount of unnecessary irritation.

The treatment of cases of the fourth type where lack of balance between the muscles of the tongue and those of the lips and cheeks are causing the trauma have to be approached by entirely different means.

The problem which confronts one is: (1) to compensate for the lack of retentive power of the muscles of the lips and cheeks by providing sufficient artificial retention to balance the pressure of the tongue; (2) if teeth have been already moved out of position it will become necessary to move those teeth back into their previous normal position in order to correct their axial inclination; (3) muscle exercises have to be instituted in order to strengthen the weak muscles of lips and cheeks to such an extent that the patient finally will not need continuous retentive apparatus. Those procedures can be best described by presenting a case of this type and demonstrating

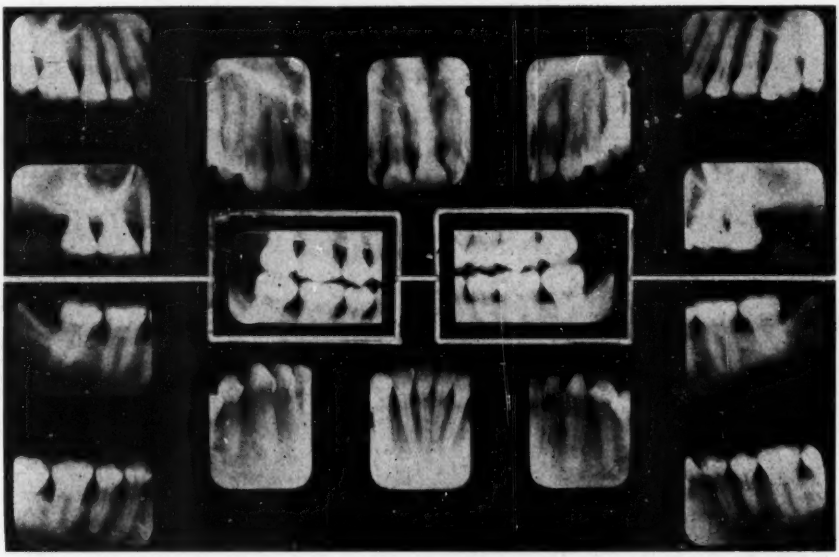

Fig. 9 Roentgenogram of case 1, 9 years and 7 months after treatment was begun.

the appliances used for its treatment and their effect. This case (Case 2) concerns an eighteen year old girl who had primarily perfect dentition, in regard to occlusion, free of caries and calculus. Within three years a diastema had formed in the upper anterior region (Fig. 10) and the central upper incisors, the two lower central and right lateral incisors and the left upper first molar became markedly loose. The roentgenograms show that the three lower incisors were almost exfoliated and hopelessly involved. The upper left central incisor and the left upper first molar present extensive reduction of the alveolar bone. There is no occlusion in the upper anterior region. The tongue of the patient has been found to be extremely bulky and presented imprints of the teeth all along its margin, while lips and cheeks were flabby and without any tone. After recognizing the etiology of the case, the following treatment was introduced:

The hopelessly involved three lower incisors were removed and appliances were constructed aiming to provide retention. Those appliances (Fig. 11) consist of acrylic horse-shoe shaped plates equipped with the following attachments; in the front there is a high labial spring wire which can be activated to exert pressure against the teeth toward the lingual. In the molar and bicuspid region there is some kind of

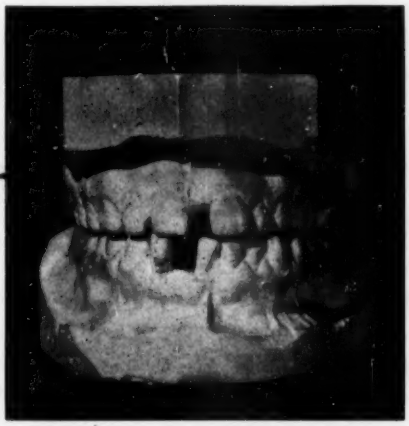

Fig. 10 Study cast of case 2 before treatment.

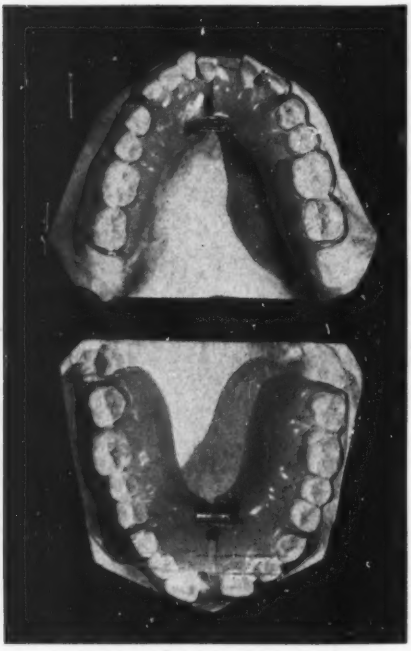

Fig. 11 Appliances used in case 2.

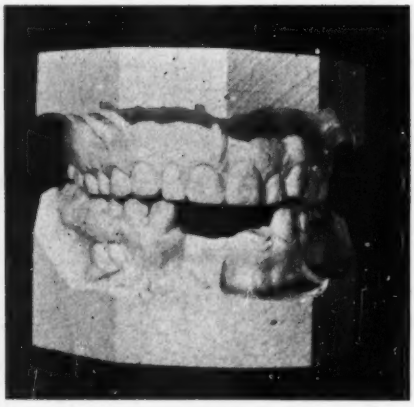

Fig. 12 Study cast of case 2, 9 years after beginning of treatment.

continuous clasp and in order to avoid any tendency of the appliance to cause expansion the appliances are split and a jack screw built which makes it possible to reduce their width so that they act in a contracting manner. The same appliance was constructed for the lower arch. It should be mentioned that the upper appliance is not provided with a bite plate since there is no indication for its use. The part of the plate which borders the upper central incisors is reduced in order to allow their lingual movement, which is accomplished by activating the high labial spring. It is understood that the forces used for those movements have to be extremely small, since they would otherwise produce

Fig. 13 Roentgenogram of the upper incisor region, 1941, 1943, 1950.

Sources and Treatment of Lateral Forces Causing Periodontal Trauma

	Force Derived From	*Type of Occlusion*	*Function Responsible For Trauma*	*Teeth Predominantly Involved*	*Therapy*
TYPE I	Muscles of mastication.	Individual malposition of teeth. Loss of contact and its consequences.	Normal mastication and other mandibular movements.	Molars and bicuspids.	Equilibration of occlusion. Restoration of contacts. Fixed splints.
TYPE II	Muscles of mastication.	Malocclusion Classes I, II—Deep overbite. Change in occlusion.	Normal mastication and other mandibular movements.	Anterior teeth.	Raising of the bite with bite plate.
TYPE III	Muscles of mastication.	Immaterial.	Abnormal mandibular movements during sleep. (Bruxism)	No preference.	Bite plate. Equilibration of occlusion. (Tentatively)
TYPE IV	Muscles of tongue, lips and cheeks.	Immaterial.	Independent of function.	Anterior teeth and first molars.	Retentive appliances. Restoration of normal axial inclination. Muscle exercise.

considerable damage. The re-establishment of the normal arch form was accomplished within four months. After this period of treatment both arches were kept in passive retention.

At the beginning of the treatment, muscle exercises were introduced in order to strengthen the muscles particularly of the lips and also of the cheeks. The patient must take two exercises three times daily. One exercise consists in expanding and contracting the mouth as wide and as narrow as possible with the greatest possible amount of force applied. The other exercise consists in contracting the mouth against resistance which is provided by two fingers which are hooked into its corners. Those exercises should be started three times daily, thirty times, and increased up to one hundred times in each period. It is quite surprising how slowly the force of those muscles is being built up and it took four full years until this patient was able to abondon the appliance during the day without presenting some extent of relapse within such a short period of time. The effect of the treatment was very satisfactory and may be illustrated best by the study cast x-ray (Figs. 12, 13); so far nine years after treatment was begun the patient has not suffered any further loss of periodontal health, which seems to indicate that the approach to the problem in regard to its etiology was correct.

Summarizing all these findings, the following outline is presented:

1. The traumatizing lateral force derives from the muscles of mastication in three of the four types described. In the fourth type lack of balance in the retentive musculature is its source.
2. The occlusion represents an important factor only in case of type 1 and 2, and is immaterial in cases of type 3 or 4.
3. Actual masticatory function is damage producing only in cases of types 1 and 2. Type 3 is the result of some pathological mandibular movement, while type 4 is entirely independent of functional or any other mandibular movements.

4. Therapeutic measures have to be directed against the particular problem which is offered by the way the periodontal trauma is produced.

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Interesting Findings in Routine Gingival Biopsy*

By ARNOLD A. ARIAUDO, D.D.S., *San Diego, California*

ROUTINE biopsy examination of a large number of periodontal cases over the period of a year, has led not only to increased appreciation of possible tissue reaction to systemic and local factors, but has given us a chance to make some interesting and rather unusual observations. Three of these cases shall be reported here.

CASE I

Male, age 51 complained of severe bleeding of his gingiva upon the slightest mechanical insult. Clinical examination revealed a rather chronic type of inflammatory reaction. The color of the gingiva was magenta, the marginal contour swollen, the papillary contour blunted, the surface texture glossy, stippled only in circumscribed areas. The consistency was boggy, the pockets were moderately deep to deep and there was some purulent exudate present. In this clinical charting, we followed the "Diagnostic Chart" of Maier and Orban.[1]

A biopsy specimen was taken from the area of the left lower first and second molars on the buccal side, fixed in Zenker-Formalin, embedded in paraffin, sectioned and stained with hematoxylin-eosin. Figure 1-A shows the general view of this papilla. Without going into unnecessary detail of the pathologic process present in this gingiva, we can readily see the dense

*From the Colorado Dental Foundation, Colorado Springs, Colorado.

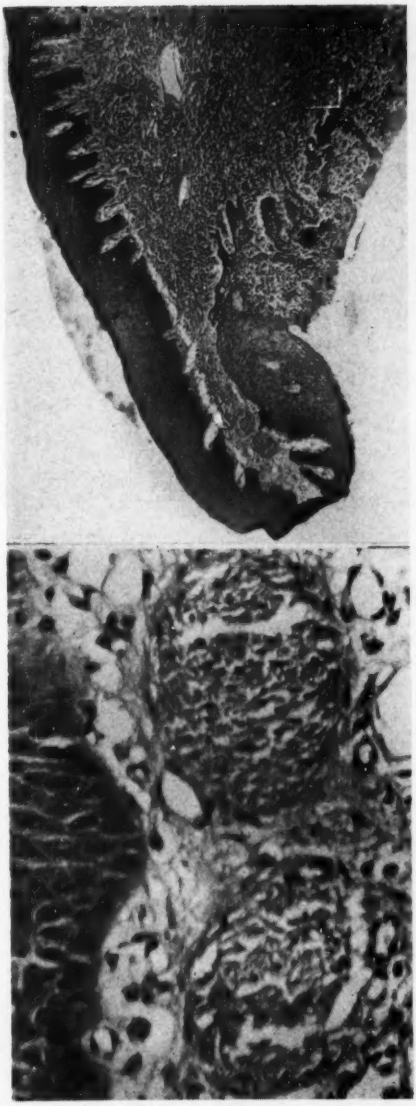

Fig. 1 A. (Above) Chronically inflamed gingiva. Two nerve bundles at the tip of gingival margin (x). B. (Below) Higher magnification of nerve bundles from Figure 1 A.

inflammatory infiltrate of the entire free gingiva. The inflammatory reaction is especially heavy in the pocket area, leading to the partial ulceration of the pocket

Fig. 2 Lingual surface of lower bicuspids, with an acute abscess on the second bicuspid (x).

epithelium. The inflammatory elements consist largely of plasma cells. Polymorphonuclear leukocytes are only found close to the surface of the pocket epithelium invading the epithelium and migrating into the pocket. This is characteristic of chronic gingival inflammation.

The unusual feature to be reported is the presence of two rather thick bundles of nerve fibers at the very tip (x) of the free margin of the gingiva (Figs. 1-A and 1-B).

Nowhere in the literature could such nerve bundles be found, either in picture or description, and men who have examined a large number of gingival biopsies reported (in personal communications) that they have never seen this phenomenon.

In three-dimensional reconstruction, we have to assume that these nerve bundles (fibers with myelin sheaths) formed a loop in the gingiva, because only a few sections from a large series showed these two nerve bundles in cross-section. Some sections showed nerve bundles in longitudinal section, in some distance from the margin within the free gingiva.

CASE II

An acute gingival abscess. The patient, female, aged 37, was referred for periodontal examination and faced possible loss of all teeth. She complained of developing

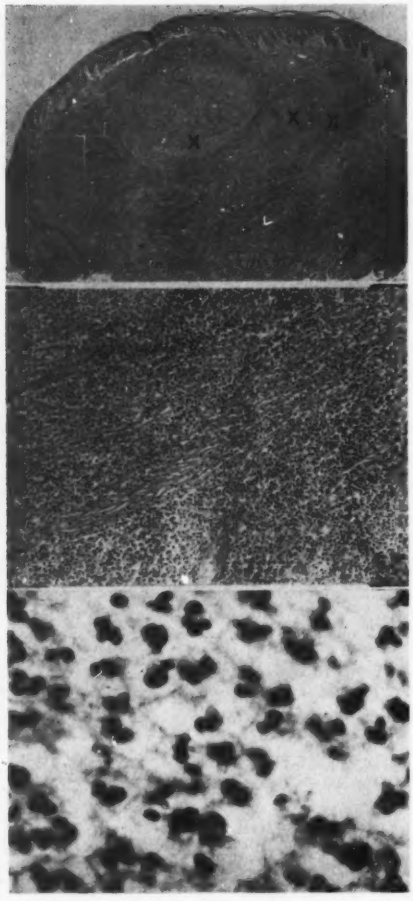

Fig. 3 A. (Above) The abscess area shown in Figure 2 was biopsied and is shown in Figure 3. There are three separate abscesses in this section (x). B. (Middle) Higher magnification of connective tissue capsule around abscess. Capsule is invaded by inflammatory cells. C. (Below) Leukocytes in the abscess.

painful abscesses in different regions of her mouth, at this time on the lingual aspect of the right lower second bicuspid x (Figure 2). A biopsy was taken, excising the entire abscess area in one piece. The patient was referred to a medical colleague for urine and blood examination and diabetes was diagnosed, a condition of which the patient was unaware! Several years prior to this, the patient had had a partial thyroidectomy.

The biopsy specimen reveals the abscess area in its entire width (Figure 3-A). In fact, there was not one abscess present, but several. The section in Figure 3-A shows one larger and two smaller abscesses x. The larger abscess reaches almost to the surface epithelium, which is very edematous (Figure 4-A) and is invaded by numerous leukocytes. The surface of the epithelium is parakeratotic. The abscesses are not very sharply demarcated; a fibrous capsule is present (Figure 3-B) but, this, too is invaded by leukocytes and phagocytic macrophages. Within the abscess cavity, the cells are almost exclusively polymorphonuclear leukocytes, found in different stages of degeneration (Figure 3-C). In some regions, a very fine fibrin network is seen and in the meshes there are the leukocytes. Outside of the abscess area in several different regions, fibrinous thrombosis of the vessels has occurred. This can be explained by the severe inflammatory reaction, but also might have some connection with the fact that this patient had diabetes. Thrombosed blood vessels have been shown in diabetes by Ray and Orban.[2]

In the periphery of the abscess area, in the marginal regions of the inflammatory reaction, dilated vessels (Figure 4-A) are observed. There is much tissue destruction in these regions with necrotic tissue remnants found free or engulfed by phagocytes (xx) (Figure 4-B). The necrotic cell fragments (x) are round, polychromatic, homogenous, round bodies of different sizes. Such tissue necrosis is often found in chronic inflammatory conditions of the gingiva in diabetes[2] as well as non-diabetic cases.

CASE III

A thirty-eight year old woman. Gingiva chronically inflamed; pockets moderately deep or rather shallow. A large calcified body (Figure 5) was found at the borderline of the attached and free gingiva. Calcified bodies in the gingiva were reported by Orban,[3] Ray and Orban[2] and lately in this Journal by William H. Hiatt.[4] Hiatt reported a similarly large calcified body

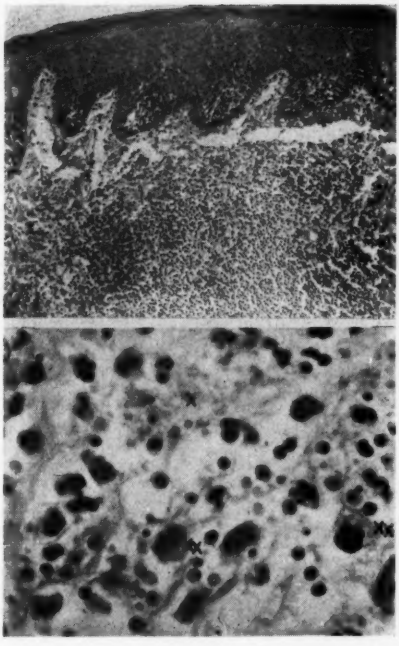

Fig. 4 A. (Above) Epithelium—above the abscess (Figure 3 A), edematous and invaded by leukocytes. Hyperemia below the epithelium, with edema and inflammatory infiltrate. B. (Below) Necrotic cell remnants in the area surrounding the abscess, partly free (x), partly engulfed in macrophages (xx).

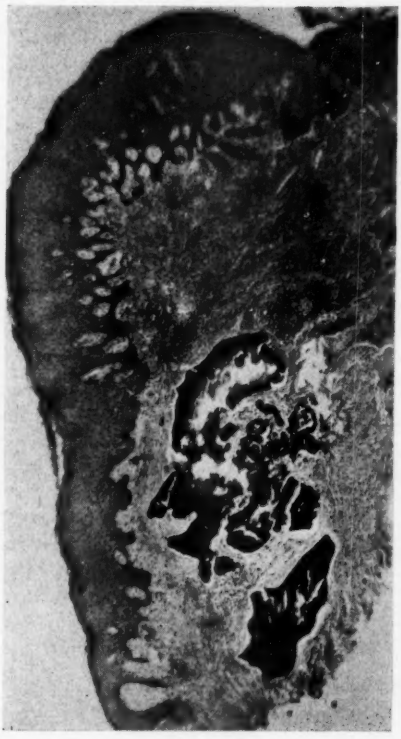

Fig. 5 Large calcified body in the gingiva.

surrounded partly by epithelium. The present case shows no epithelium. It is completely surrounded by connective tissue. This specimen was not decalcified and that is the reason for some tears in and around the calcified area. In some regions, deposition of an uncalcified layer upon a calcified surface can be observed, and at one point resorption of the calcified tissue by osteoclastic giant cells is in progress. The nucleus from which this large calcified mass has developed, might have been some cementum remnants from a deciduous tooth or a necrotic mass of connective tissue as discussed by Hiatt.[4]

SUMMARY

Three findings obtained by routine gingival biopsy are reported:

1. The presence of nerve bundles in the very tip of the free gingiva is shown.

2. A gingival abscess was excised and its detail studied in microscopic specimen.

3. A large calcified body is shown at the border of free and attached gingiva.

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An Instrument for Measuring Tooth Mobility

By R. S. MANLY, A. YURKSTAS AND J. B. RESWICK, *Boston, Mass.*

THE clinical procedure for estimating tooth mobility depends upon a personal judgment of tooth movement when force is applied to the tooth. It is not precise, and is subject to bias because of the expectations of the examiner. A more precise and objective method would have several practical applications. Response to treatment for periodontoclasia might be observed sooner and with greater certainty. Degrees of mobility might be distinguished before they could be noted clinically, which would assist in judging the load bearing capacity of a particular tooth and aid prosthodontists in selecting the teeth to be used as abutments in prosthetic restorations. Information on abutment teeth after partial dentures were in function might provide warning that undo stresses were being received. Orthodontic treatment could be evaluated by comparing the mobility of teeth produced by different technics.

Elbrecht[1] and Werner[2] tried to make the usual clinical method objective by controlling the force applied to a tooth and measuring the deflection of the tooth. Their procedures were inconvenient or impractical because considerable forces were required to produce movements of a few thousandths of an inch. These considerations led Beyeler and Dreyfus to begin a study of a vibration method for measuring mobility. A report of their investigation[3] appeared a few months after our study had begun. Their equipment was disclosed in diagram form, and results were reported on a laboratory model.

A vibration technic would possess advantages. If a tooth could be set into vibration by driving it with a vibrating rod, the mobility might be related to the amplitude of vibration when the driving force was kept constant. A fixed reference would not be needed in this case, since the inertia of the instrument and the jaw would serve to hold these in proper relation to each other. If the tooth were firm, it would move back and forth very little. Furthermore, if the periodontal membrane were truly elastic, there would be frequencies at which the tooth would resonate and could be maintained in vibration with very little input of energy.

PROCEDURE

The equipment for studying this principle was selected in order to permit a wide range of frequencies to be studied, to note whether resonance occurred at any frequency, and to measure how far the tooth vibrated at each frequency. A Jackson Model 652 audio frequency oscillator was connected directly to a Brush record cutter, No. RC20. A stainless steel rod, 1 millimeter in diameter, was soldered at right angles to a rod having a size that would fit the cutter. A notch was filed in the stainless steel rod opposite the end of the cutting needle. An LP-21 Astatic pick-up unit was placed with the pick-up needle resting in the notch. The cutter and pick-up were separated by a formed piece of cork. The output from the phonograph pick-up was connected with the phonograph input circuit of a Newcomb 10 watt amplifier and the output from the amplifier was measured by means of Weston model 695, type 11, decibel meter. With this equipment, the rod could be set into longitudinal vibration at frequencies ranging from 20 to approximately 15,000 cycles per second. The amplitude of vibration of the rod could be determined from the readings on the decibel meter.

Preliminary tests failed to indicate that normal teeth had a true resonant frequency, but encouragement was given to the hypothesis that tooth mobility might be

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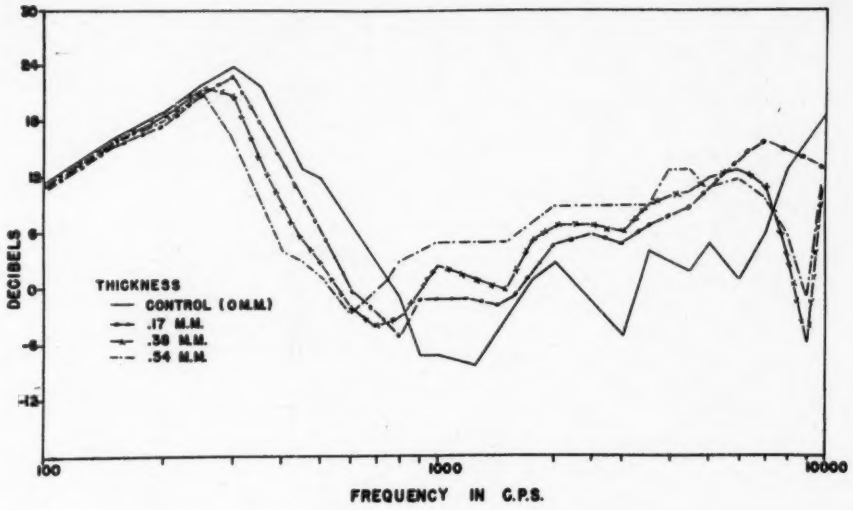

Fig. 1. Effect of thickness of dicor layer on roots of teeth.

measured from the amount of vibration at some particular frequency. It seemed logical to search next for the frequency which would best differentiate teeth with known degrees of mobility.

RESULTS

In Vitro Models

In vitro models were prepared in an effort to duplicate the elastic properties of the structures supporting a tooth in alveolar bone. A series of experiments were undertaken in which imitation periodontal membranes were prepared from Dicor, a plastic used for facial prostheses. Four similar upper centrals, four upper lateral incisors, four lower incisors and four premolars were employed. The teeth and glass rods were simultaneously dipped into wax melted in a water bath at 100° C. One tooth from each type was uncoated, the other three teeth received 1, 2 or 3 dips into the wax. The thickness of wax on the glass rods were found to be 0.17, 0.38 and 0.54 mm., and the coatings on the teeth were assumed to be the same. The teeth with the wax coatings were then invested in flasks, boiled out and processed with Dicor. They were set in hemispheres of white stone with just the anatomical crown exposed.*

The rod from the instrument was placed on the middle third of the labial surface of a tooth and amplitude measurements were recorded for frequencies ranging from 100 to 10,000 cycles. These readings were compared with those obtained when the rod was touched against the fingertip in order to provide a control reading on the equipment itself. The data are recorded in Figure 1. There is little distinction between the control reading and those obtained on teeth at frequencies below 300 cycles and above 8,000 cycles. The frequency range of interest, of course, is that at which different thicknesses of periodontal membrane produce different instrument readings. This range can be seen to be 800 to 6,000 cycles and the best single frequency was estimated to be 1000 cycles. At this frequency the control tooth produced an instrument reading that was 32

*None of the teeth were movable according to the usual clinical criterion.

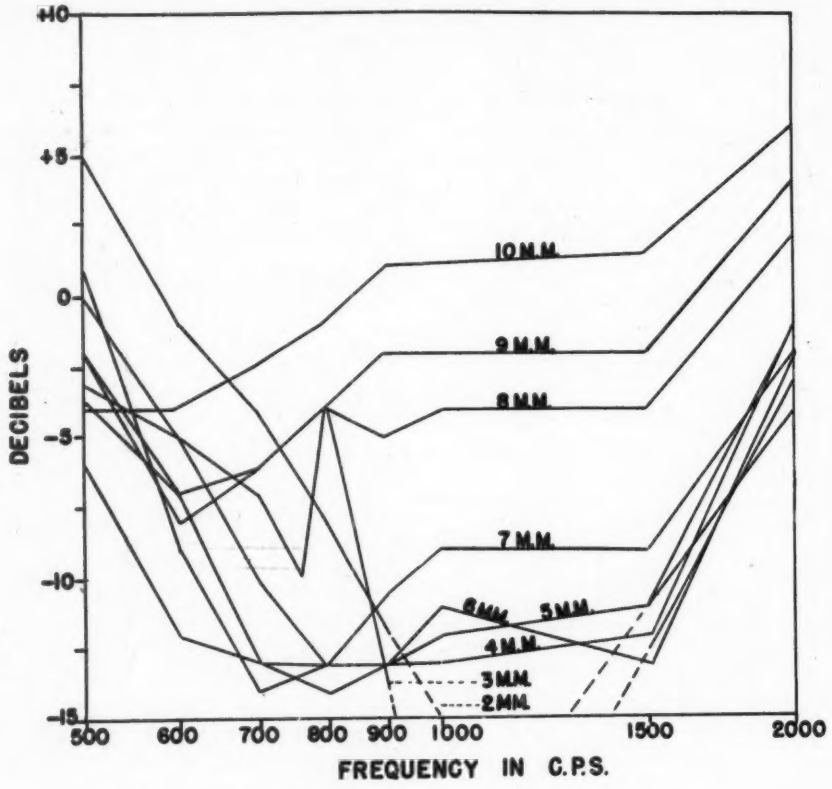

Fig. 2. Influence of loss of supporting structure on tooth mobility.

decibels lower than the reading when the rod of the instrument was touched against a finger. The teeth with 0.17 and 0.38 mm. pseudo-periodontal membranes gave readings that were 8 decibels higher than the control which was set directly in stone. The tooth with 0.54 mm. of membrane provided 17 decibels higher reading than the control. The same conclusion was obtained from findings with premolars. The range 700 to 5,000 cycles provided some distinction between the four teeth but the best separation of the teeth occurred at 900 to 1250 cycles. A similar finding was obtained with different series of teeth, using friction tape and rubber as the imitation periodontal membranes. These results indicate that 1,000 cycles is the best frequency for use of this equipment to distinguish teeth with different thicknesses of pseudo-periodontal membrane.

SIMULATION OF LOSS OF BONY SUPPORT

In the preceding experiment, all teeth had the same amount of root covered by dental stone. Tooth mobility develops more often from alveoloclasia than from thickening of the periodontal membrane, and it seemed important to test whether the equipment would disclose mobility attributable to bone loss. Six cuspids were selected and their roots were dipped 15 times into a saturated solution of gutta-percha in carbon tetrachloride in order to

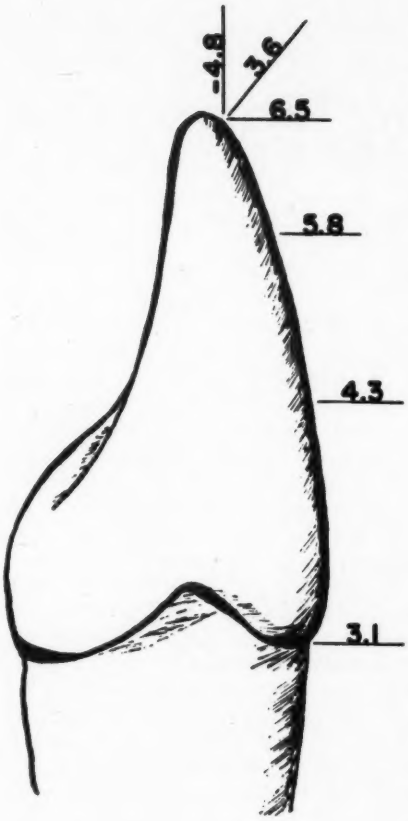

Fig. 3. Average decibel reading on the four mandibular incisors.

build up a layer of definite thickness on the root portion. A control experiment with glass rods demonstrated that this treatment should have produced a layer 0.29 mm. thick upon the root portion. The instrument was adjusted to read 12 decibels at 1000 cycles and readings were taken from 100 to 10,000 cycles with the instrument touching the tip of a finger gently. A second series of readings were taken with the instrument gently touching the labial surface of one of the cuspids. Next the stone was scraped from the neck of the tooth to a depth of 1 mm., producing an imitation loss of bony support. Readings from 100 to 10,000 cycles were repeated. The "pocket" was deepened by another millimeter and readings again taken. This procedure was repeated until a depth of 10 mm. was reached. The curves in Figure 2 show that there is an accurate correlation between depths of "pocket" and instrument readings over the range 800 to 1500 cycles per second. At no other frequencies would the loss of support to the tooth be consistently shown with this equipment.

INFLUENCE OF POSITION AND DIRECTION AT WHICH VIBRATION WAS APPLIED

Some preliminary tests were made on the teeth of one subject (RSM). It was observed that the location and direction of the applied vibration would affect the readings on teeth *in vivo*. In order to obtain information concerning the exact magnitude of this influence, readings were made on the lower central incisors of this subject by two operators. All readings were made at 1,000 cycles per second with the instrument adjusted to produce a meter reading of 12 decibels against the fingertip. The different directions and locations are shown diagrammatically in Fig. 3. The arrow indicates the position and direction of the rod, and the figures on the arrow represent the mean and standard deviation of a single determination. As would be expected the greatest amplitude of vibration is obtained when the rod is applied at right angles to the long axis of the tooth as near to the incisal edge as possible. Readings taken near to the gingiva show that less vibration of the tooth takes place. The least motion is experienced when the instrument is applied to the incisal edge, parallel with the long axis of the tooth. Motion in the labial-lingual direction is 3.5 times as great as in the axial direction. It is well known that teeth can resist loads axially better than labial-lingually but this figure represents the first known attempt to estimate the difference quantitatively.

DEVELOPMENT OF INSTRUMENTS SUITABLE FOR CLINICAL TRIAL

The equipment was tested on subjects with teeth of different degrees of clinical mobility. The device gave readings as high as 13 decibels on teeth which are extremely loose clinically. Normal teeth read as low as 6 decibels. Unfortunately, readings on different days did not check well and observations by different workers sometimes varied widely. The difficulty was traced to a pressure sensitivity of the instrument, whereby slight changes in force used to apply the instrument to teeth affected the readings as much as 6 decibels. A precision of $\pm$ 1 decible was needed in order to distinguish different degrees of tooth mobility that could be judged clinically, and this amount of pressure sensitivity could not be tolerated. Several modifications were tried, including the insertion of a 1000 cycle tuning fork into the mechanical system, which gave some improvement but not sufficient for the purpose.

DETAILS OF PRELIMINARY CLINICAL MODEL OF MOBILOMETER

The solution to the problem of pressure sensitivity was achieved by mechanical arrangements that tend to stabilize the axial force and to minimize the lateral components of force. The vibrating rod was formed into a hook at the end, which allowed the weight of the instrument to rest on the incisal or occlusal surfaces of the teeth.

The clinical model of the equipment was designed to eliminate this pressure sensitivity, to reduce the bulkiness of the accessory electronic equipment, and to increase the difference in readings between mobile and firm teeth. The electronic equipment is housed in a single cabinet. This contains a 1000 cycle oscillator, a power amplifier for actuating the driving crystal, circuits for current amplification of the output from the vibration pick-up, and meters for measuring the driving and pick-up voltages. The handpiece consists essentially of a driving crystal (Brush Development RC20), a vibration pick-up (Astatic B9) and a specially prepared coupling rod. These components are housed in an aluminum frame from which the vibrating rod projects. Details of the handpiece and the coupling rod are shown in Figure 4. The hook on the end of the coupling rod was designed to rest on the occlusal or incisal surfaces of the teeth being investigated so that the full weight of the instrument was carried. With mandibular teeth a constant and duplicable reading was obtained. Measurements on maxillary teeth were less satisfactory because it was difficult to maintain a constant force of application when the instrument was held in the hand. A second clinical model is under development with a means for eliminating this difficulty; the instrument reads only when the proper force is being applied.

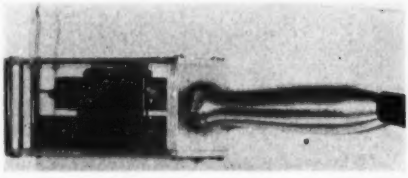

Fig. 4. Preliminary clinical model of mobilometer head.

Before operation the instrument is turned on and allowed to warm up for a few minutes. The voltage on the driving crystal is adjusted to a constant value. The patient is seated in a dental chair in an erect position. The coupling rod is hooked over incisal edge of the tooth to be studied, and the handle of the instrument is oriented in line with the long axis of the tooth. It is steadied in position with the minimum of hand pressure and a foot switch is pressed. The reading is recorded and the foot switch released. With teeth showing any visible mobility, there is difficulty in obtaining a constant reading, and the orientation of the instrument must be adjusted until a minimum reading is obtained. For readings on molars the extreme end of the hook of the coupling rod is placed in

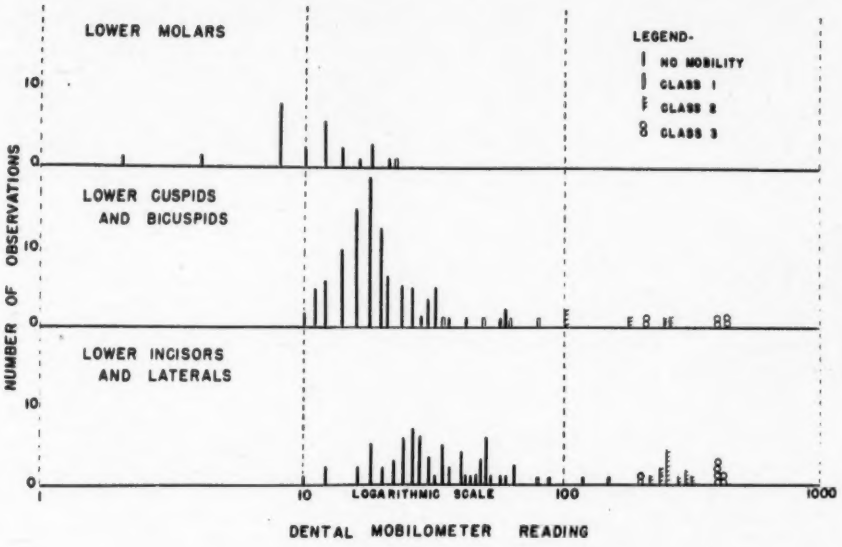

Fig. 5. Dental mobilometer reading vs. clinical mobility.

the median sulcus. As a check on the ability of the instrument to detect and separate different degrees of clinical mobility of teeth, observations were made on the lower teeth of 24 subjects from incisors to first molars. Several of these subjects were periodontal patients with mobilities ranging up to type 3. The results were given in Figure 5. The instrument reading is plotted on the abscissa and the clinical mobility on the ordinate, centrals are grouped with lateral incisors, and cuspids with bicuspids. The molars are presented separately. There were 80 determinations on central or lateral incisors. Teeth with no clinical mobility ranged from 10 to 64 units and the five teeth with class 3 mobility ranged from 400 to 600 units. Teeth with class 1 and class 2 mobilities fell intermediate. In only one instance is there overlapping. Molars showed lower readings on the average with the normal group ranging from 2 to 22. The normal bicuspids and cuspids ranged from 10 to 42 units, those with class 1, 2 or 3 mobility had progressively greater readings on the average. There was a small proportion of overlapping of values in different groups. It was considered that the equipment was sufficiently precise to warrant its clinical use on an experimental basis.

DISCUSSION

From a physical standpoint, the evaluation of tooth mobility consists of determining the "effective spring constant" of the supporting structures of the tooth. The effective spring constant is a measure of the "stiffness" of a tooth in its mounting. It is estimated by a clinical judgment of tooth mobility, whereby a force is applied to the labial surface of the tooth and the amount of motion of the tooth is estimated by eye. The ratio of force to motion is an index of the effective spring constant. If these estimations could be obtained accurately by instrument, the effective spring constant could be calculated, but this is not feasible with a static force for reasons already mentioned.

The problem of measuring mobility is considerably simplified when the force is

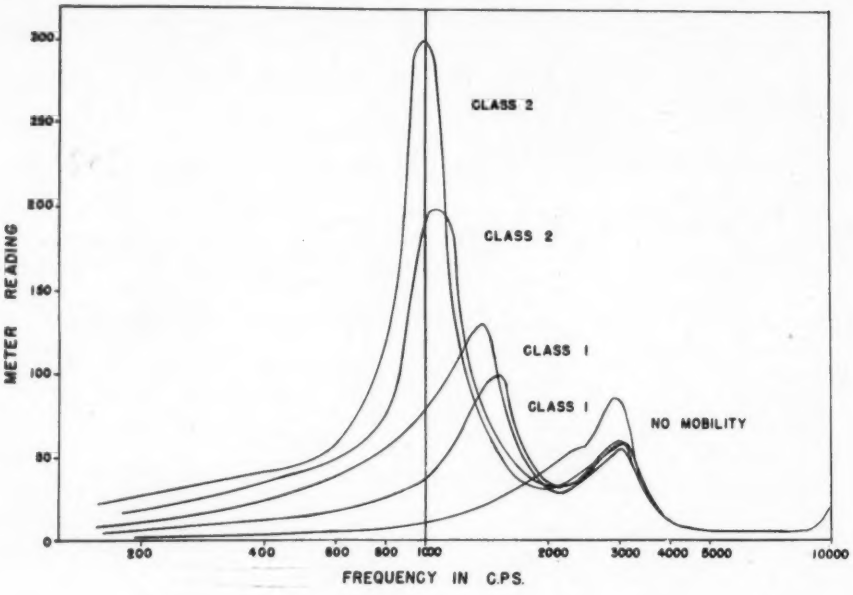

Fig. 6. Illustration of resonance for teeth with clinical mobility.

applied as a vibration rather than a static force. The extent of vibration can be measured in terms of the voltage produced from a vibration pick up. A mobile tooth will move through a greater amplitude and produce a greater voltage when a steady vibratory force is applied. With an important exception, the amplitude of motion of the tooth increases in proportion to the mobility of the tooth.

Complication arises when the tooth and instrument are in vibration at a frequency which is near or at the natural frequency of the system. At this particular frequency, the tooth in its mounting may vibrate like a tuning fork, developing tremendous amplitudes with the same input of vibrational energy. This means that the voltage obtained from the vibration pick-up will be affected by the proximity to natural frequency of the system as well as by the mobility of teeth. The natural frequency itself also depends upon mobility and as mobility increases, the natural frequency decreases. This information may be used to advantage in the design of a mobilometer.

The frequency at which the instrument operates should be set slightly below the natural frequency of the most mobile type of tooth to be studied. Under these conditions the readings on mobile teeth will be high not only because of the mobility of these teeth, but also because the instrument is operating near the natural frequency of the teeth. This concept is exemplified on Figure 6 on which is plotted data obtained from a study on five teeth with different degrees of mobility. Three readings are plotted on the vertical axis and frequency on the horizontal axis. This figure demonstrates the increase in amplitude as well as the shift in natural frequency. The natural frequencies of the least and most mobile teeth of the series appear to be respectively 2400 and 1000 cycles per second. The inflection at 2400 cycles per second indicates the resonant peak which would remain unnoticed unless one were expecting it to

be there. The natural frequencies of other teeth are intermediate between these extremes. The readings from the clinical model would correspond to the points at which the curves cross the vertical axis at 1000 cycles. This finding appears to justify the selection of 1000 cycles as the first approximation for our present equipment. The approach proposed by Beyeler and Dreyfus made use of the same principle employed by us, but his instrument was designed to operate at 50 cycles per second. Fifty cycles per second would be completely unsatisfactory for equipment of our type due to the lack of sensitivity at this frequency.

SUMMARY

An instrument has been developed for estimating tooth mobility by measuring the amplitude of motion of teeth subjected to forced vibration. The apparatus consists of a phonograph record cutter and pick-up, a 1000 cycle oscillator and power amplifier plus meters for measuring the driving and pick-up voltages. A rod which has been formed to rest on the incisal edge of a tooth supplies a vibrating force and transmits motion to the vibration pick-up.

The principle of the instrument was studied with teeth set in dental stone with the roots covered with different thickness of imitation periodontal membranes. It was found that optimum differentiation between teeth with different mobility was obtained at 1000 cycles. The same frequency was most effective in disclosing mobility which arose from loss of support caused by removing stone from the necks of the teeth.

The influence of location and direction of the applied vibration was also studied. The greatest mobility reading was obtained when the instrument was tested on the incisal edge at right angles on the long axis of the tooth. Readings gradually diminished as the instrument was moved toward the neck of the teeth. The mobility in an axial direction was approximately 0.3 as great as that in the labio-lingual direction.

The development of an instrument suitable for clinical trial required elimination of pressure sensitivity which was inherent in the early models. A statistically significant correlation was found between meter readings and mobility judged clinically. A theory of operation was proposed and was substantiated by readings over a range of frequencies on teeth with different degrees of clinical mobility.

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We regret to announce the death of Dr. Walt E. Hopper, of 3333 NE Sandy Blvd., Portland, Oregon in May 1951.

Electrosurgical Gingivoplasty—A Technic

MARVIN M. SUGARMAN, D.D.S., *Atlanta, Georgia*

THE criterion of successful periodontal therapy varies greatly, and it is time the following questions are answered. What constitutes successful periodontal treatment? What do we achieve by our method of choice? Is the elimination of the pathologic pocket enough? Are we satisfied with gingival tissue, which, following periodontal therapy, does not tend to maintain itself in function? Is continual treatment and control of periodontal disease the best we can hope for? What is our goal and how can we best approximate this ideal condition? This paper presents a technic, electrosurgical gingivoplasty, that enables us to more nearly reach the ideal state than has been hitherto devised. The four cases reported illustrate the technic.

The elimination of the pathologic pocket and restoration of physiologic function are of prime importance. The contour, thickness, and position of the remaining gingival tissue are considered after these two factors have been treated. The deformities that are left or persist after therapy are of great concern. The maintenance of healthy periodontal tissues requires diligent home care upon tissues having good architectural form. The acquisition of this physiologic form is an addition to treatment that immeasurably enhances its chance for success. Our yardstick of achievement therefore must be based, not only on comparison of the gingivae at the beginning of therapy with the gingivae after therapy, but also on comparison with the gingival form after treatment with the ideal physiologic form. The ultimate goal is the acquisition of gingival tissue which, with proper home care, will maintain itself in function.

ENAMEL AND GINGIVAL ARCHITECTURAL FORM

The function of the enamel contour on the labial and lingual surfaces of the teeth in deflecting food from the gingival margins has been established. The occlusal marginal ridges with their triangular spillways to prevent food from reaching the interproximal gingiva has been demonstrated. The importance of maintaining these anatomical forms in restoration is taught dilligently even to the freshman dental student. However, the maintenance of the physiologically normal gingival architectural form has been slighted by many in the development of successful periodontal therapy. Normal gingival tissue should be pink, end in a knife-like edge and have a gingival crevice approaching zero depth. Stippling should be present in the attached gingiva. Gingiva with proper architectural form is well contoured, properly positioned and has interproximal sluiceways.

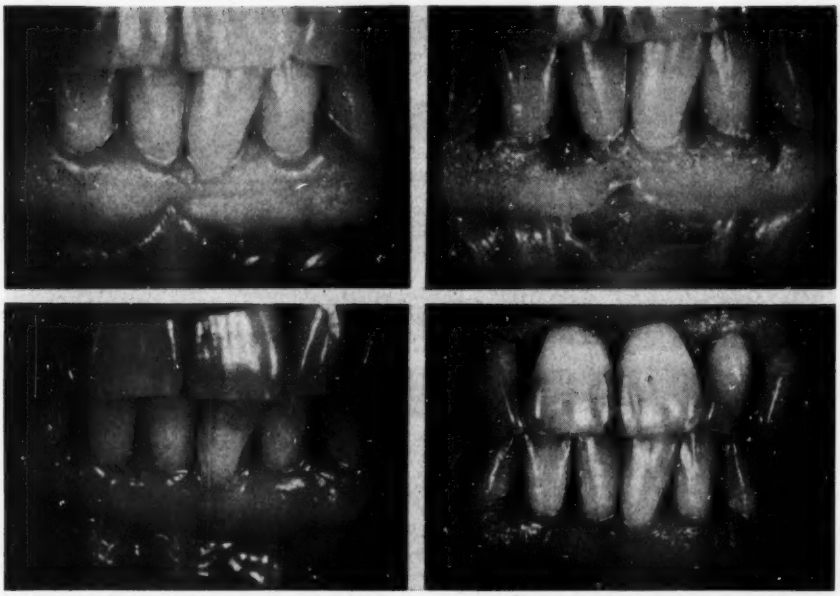
DEFINITION AND INDICATIONS FOR GINGIVOPLASTY

Gingivoplasty may be defined as any operative procedure employed to obtain proper gingival architectural form. The indications for this therapy is as follows:

1. To reduce the thickened gingival margin after subgingival curettage.
2. To change the position and thickness of the gingival margin.
3. To eliminate any craters that may be left after necrotizing ulcerative gingivitis.
4. To reposition the frenum or muscle attachment that may interfere with proper toothbrushing.
5. To reshape the gingival tissue in the crowded lower anterior regions where extraction is not indicated.
6. To acquire better esthetic form.

CASE REPORT #1

A white female, age 38, presented with the chief complaint of bleeding gingivae that recurred although she received periodic periodontal treatment. The medical re-



Case Report #1. Electrosurgical gingivoplasty is used to reduce and contour thickened gingival margin that may follow subgingival curettage. (Female, Age 38)

Fig. 1. (Above, left) Shows a thickened gingival margin that is traumatized and bleeds easily. Subgingival curettage has been accomplished. Further improvement is not expected. Gingivoplasty is the final step.

Fig. 2. (Above, right) Shows gingivoplasty completed—immediately after operation.

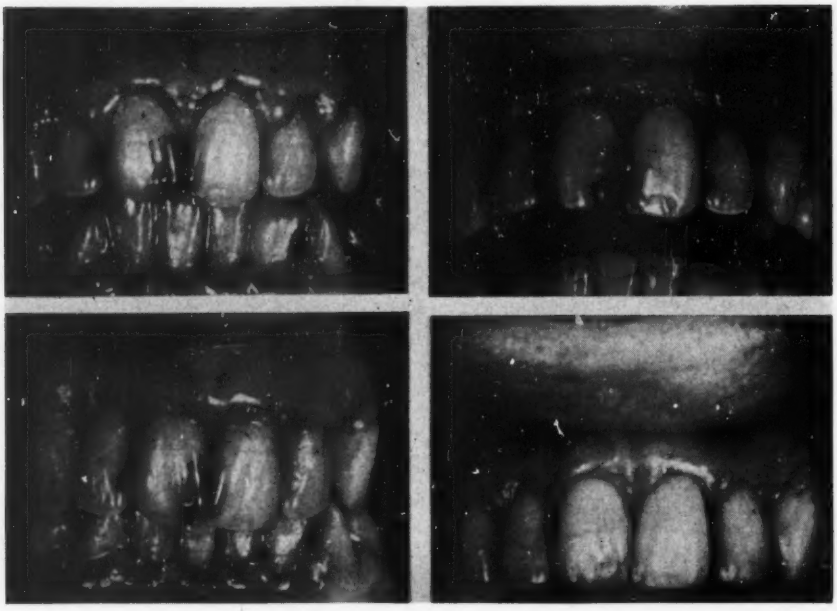
Fig. 3. (Below, left) One week later—note the lowered frenum to allow better brushing.

Fig. 4. (Below, right) Showing the good architectural form achieved. Note the contour, the interproximal spillways.

port was essentially normal and the etiological factors were considered local. Oral examination (Fig. 1) revealed a crowded arrangement of the teeth and an apparent neglect of needed orthodontic treatment. The marginal gingiva showed the result of food trauma. The tissue was neither inflamed nor edematous and could not be expected to shrink with treatment of subgingival curettage alone. Note the lack of stippling and the absence of vertical sluiceways in the attached gingivae. The occlusion was adjusted and subgingival curettage accomplished. Electrosurgical gingivoplasty (Fig. 2) is performed using a point electrode. The free gingiva is thinned to a knife-like edge and the labial frenum is lowered to allow better brushing. Observe the vertical sluiceway obtained between the left lateral and cuspid. After one week (Fig. 3) the surgical dressing is removed and healing is progressing. The final result of therapy (Fig. 4) shows the architectural form achieved. Note the contour and knife-like edge of the gingiva, also the stippling and sluiceways now present.

CASE REPORT #2

A white male, age 22, in poor health, complained of bleeding gums and soreness in his front teeth. He had been advised to have all his teeth extracted. He had been ill, and had a continual tired feeling. His medical report reveals a marked anemia and a definite vitamin and mineral deficiency. His average caloric intake daily was 2300 calories. Oral examination (Fig. 5) showed poor mouth hygiene. A strong fetid odor and a frank purulent discharge was present.



Case Report #2. Electrosurgical gingivoplasty may be employed in conjunction with gingivectomy. (Male, age 24)

Fig. 5. (Upper, left) Preoperative photograph of patient.
Fig. 6. (Upper, right) Showing gingivectomy with electrosurgical gingivoplasty as the final step in the surgical technic.
Fig. 7. (Lower, left) Ten days post operative.
Fig. 8. (Lower, right) Note physiologic architectural form obtained.

An abnormal deep red color and hyperplasia of the gingival tissue was observed. There was marked looseness of the anterior teeth. The gingival tissue would bleed upon touch. His physician prescribed for his systemic difficulties. The oral treatment of choice was gingivectomy with electrosurgical gingivoplasty as the final step (Fig. 6). Note how the sluiceways have been placed especially over the right lateral. Also observe the angle of the incision with the scalpel. Everything is done with final objective of good architectural form always in mind. Ten days post operative (Fig. 7) shows the degree of healing. The final result (Fig. 8) showing the fine architectural contour and sluiceways, and presenting a tissue that will maintain itself in function.

ADVANTAGES OF GINGIVOPLASTY WITH THE ELECTROSURGICAL CURRENT

1. Better vision due to the sealing of the vessels.
2. No pressure is necessary—an aid in removing unattached tissue.
3. The desired bevels can be made easily.
4. Very thin sections can be removed—a difficult task with a knife.
5. Greater accessibility due to the size and shape of the electrodes.

DISADVANTAGES

Most of the complications are due to inexperience or inadequate equipment. The purchase of a machine with the manufacturer's directions for its use is not enough. Previous clinical experience with an ac-

Case Report #3 Electrosurgical gingivoplasty is the treatment of choice to contour gingival tissue in areas where the teeth are mal-aligned. (Male, age 28)
Fig. 9 Preoperative photograph showing crowded anterior area.
Fig. 10 Area following subgingival curettage and occlusal equilibration.
Fig. 11 Gingivoplasty by electrosurgery.
Fig. 12 Note the physiologic architectural form acquired.

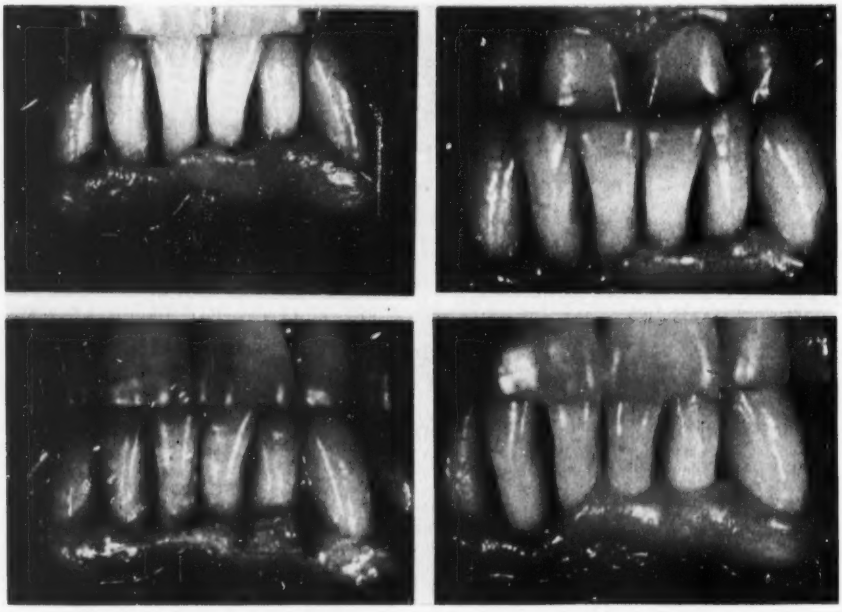
cepted technic of gingival surgery using a knife is an aid to successful electrosurgical gingivoplasty. Over-coagulation, prolonged contact, and disregard of surgical principles may result in tissue trauma and sloughing. Smoke produced by the high voltage, high frequency phenomenon, is at times annoying.

CASE REPORT #3

A white male, age 28, had a pronounced deep overbite involving primarily the lower four incisors (Fig. 9). This type of case affords a definite problem. The gingival tissue is traumatized and bleeds upon probing. Subgingival curettage has been performed on several occasions. The gingival tissue tone improves only to regress in function (Fig. 10). Note the absence of stippling and the poor gingival form. Electrosurgical gingivoplasty is accomplished (Fig. 11). The gingival incisal margins are thinned, especially at the distal of both laterals. The labial frenum is lowered to allow better brushing. The traumatic occlusion has been adjusted. The final result (Fig. 12) shows a tissue that with proper brushing can maintain and perpetuate itself in function. Note the stippling and interdental folds.

CASE REPORT #4

A white male, age 33, had necrotizing ulcerative gingivitis of long standing (Fig. 13). The craters between the labial and lingual marginal gingivae were from 1½–2 mm. deep. Dental history revealed treatment that consisted of chronic acid applications. Oral examination revealed not only the deep craters, but also periodontal pockets of varying depth. Initial treatment consisted of the removal of calculus, the con-



Case Report #4 Electrosurgical gingivoplasty is an improved technic to eliminate craters following Necrotizing Ulcerative Gingivitis. (Male, age 33)

Fig. 13 Shows deep craters following Necrotizing Ulcerative Gingivitis.

Fig. 14 Following subgingival curettage and medication.

Fig. 15 Gingivoplasty by electrosurgery—half completed.

Fig. 16 Note the fine physiologic architectural form achieved.

stant use of hot rinses and terramycin, 500 mgs., every six hours for 24 hours. The tissue responded favorably (Fig. 14) and there was no bleeding upon pressure. Upon the left side which had alveolar support electrosurgical gingivoplasty was performed Fig. 15). Note the placing of sluiceways and the reshaping of the interdental papilla. The final photograph (Fig. 16) shows the results obtained. Compare Figures 12 and 16 to see the architectural physiologic form as a result of electrosurgical gingivoplasty.

The importance of home care in all cases cannot be over-emphasized. A diligent home care routine is taught all patients. Electrosurgical gingivoplasty per se will not maintain this newly acquired form. However, with proper home care gingivae with good architectural form will tend to maintain itself in function.

TECHNIC FOR GINGIVOPLASTY BY ELECTROSURGERY

1. Local anesthesia is used and infiltration is the method of choice because of the hemostatic effect.
2. The electrosurgical machine is set at the optimum point to get smooth, even cutting without sparking. Experience and practice will teach the operator the ideal setting.
3. The patient holds or sits upon the indifferent electrode.
4. Using the cutting current, the operator thins the tissue by removing very small sections.
5. The thickness of the remaining tissue is tested by inserting an explorer through the tissue in the direction perpendicular to the bone.

6. Remove tissue to the desired height.
7. Test for thickness again.
8. Feather edge the incisal margin of the tissue to acquire the desired knife-like edge.
9. Contour and develop vertical sluiceways where necessary.
10. A surgical pack will eliminate most of the postoperative pain. After five days or a week, a second pack may be placed if indicated.

PRECAUTIONS

1. Avoid contact with periosteum and bone.
2. Keep the point or blade continually in motion to avoid overcoagulation and sloughing.
3. The use of wooden tongue depressor or mouth mirrors with plastic backs to replace the metal is a protection to the patient.

SUMMARY

The position and contour of the gingival tissue is a great factor in the maintenance of the gingival tissue tone and health. The use of electrosurgical gingivoplasty is an improved technic to accomplish this highly desired physiologic architectural form.

Appreciation for the origin of the philosophy and the term, *gingivoplasty* by Henry M. Goldman, D.M.D., is gratefully acknowledged.

605 Medical Arts Bldg.

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There is a place for every dentist in the field of research according to his particular interests and talents. A keen and thoughtful observation of what one sees in the mouth in everyday practice, especially as regards the not-too-obvious symptoms and signs of deviation from the normal, and a critical attitude toward one's own experience with different methods and therapeutic measures, constitute a form of research which is an invaluable addition to the scientific information developed in the laboratory. And especially important would be the sum of these personal findings, when or if recorded, as a priceless permanent contribution to the literature of the profession.

From a report by Dr. Celia Rich to the Southern Academy of Periodontology, May 28, 1951.

Editorials

Plans for Increasing the Usefulness of The Journal of Periodontology

The Journal of Periodontology enjoys the reputation of being a forthright example of what a professional journal should be—a reputation which it has maintained since it began publication in 1929.

It has the further distinction of being the only publication dealing exclusively with the science and art of periodontology. Its objective is the dissemination of knowledge in that field.

That there is widespread need of this will be evident when told that periodontal disease is responsible for the loss of more teeth in adult life than any other single disease and that only about 2% of undergraduate instruction now being given is devoted to the teaching of periodontia.

To aid in overcoming this situation is one of the responsibilities of The Journal. How to do this more effectively is the problem at present confronting the publishers.

In the belief that increased circulation might be helpful, The William J. Gies Foundation for the Advancement of Dentistry, Inc. has made a grant to The Journal for the specific purpose of giving it wider distribution.

In making the grant the Board of Directors of the Foundation recommended the sending of copies gratis to a selected list of libraries, dental and medical schools, teachers of periodontology and related subjects for the purpose of emphasizing the importance of periodontia in the practice of dentistry.

In conformity with the purpose of the grant, steps will be taken to place The Journal where it can be most helpful in promoting a better understanding of periodontia; with it will be sent a letter explaining its purpose.

Subscribers to The Journal are invited to cooperate by sending to the Editor the names of individuals, dental schools, libraries, etc. that might profit by the receipt of such copies.

The publishers of The Journal take this opportunity to express their thanks and appreciation to The William J. Gies Foundation for the Advancement of Dentistry, Inc. for their public-spirited action.

A. H. M.

The Soft Multi-Tufted Toothbrush

Judging by the volume of sales, the soft "multi-tufted toothbrush" has become exceedingly popular with the public and many of the dental profession during the past year. The demand for these brushes has been so great that practically all the major toothbrush companies are now offering them for sale.

The design of the multi-tufted brush is by no means new, having been used on a limited scale for many years. Most of the modern multi-tufted brushes are made of bristles of fine nylon measuring between .008 and .010 of an inch in diameter, 30 to 60 bristles in each tuft and 35 to 75 tufts on each brush. The size and shape of the brushes vary but most of them have all the bristles trimmed to the same height.

Several periodontists have advocated the use of this type of brush for many years, using the physiologic toothbrushing technic. Ten years ago T. Sidney Smith wrote as follows:

"The physiologic method is the one which gently cleanses the gingival sulci and massages the investing tissues by permitting the bristles of the brush to travel in the same general direction as the food. The main strokes of the bristles are guided upward over the upper teeth and gums and downward over the lower. This is Nature's way of cleansing and stimulating the tissues. If some of the strokes should travel in the opposite direction, that is toward the incisal edges of the teeth, they will be harmless; but a few horizontal strokes of the brush in the molar region will aid in cleansing the portion of the sulci that is directly over the bifurcation of the roots. The horizontal strokes should be given separately and be limited to a few, since they wear grooves in the cervical portions of the teeth. It is very important to do the cleansing and stimulating in a uniform way. There is a tendency to neglect surfaces of the teeth that are hidden or difficult to reach and it will be found helpful, in overcoming the habit of neglect, to count the number of strokes of the brush required to thoroughly clean surfaces of the teeth that are easy to reach, and then apply the same number to the less accessible parts.

"The brush must not injure or irritate the tissues. It is irrational to brush unhealed or diseased gums, but, when healed, they can be strengthened by the judicious application of friction, just as the hands can be toughened and strengthened by labor. It is the amount of friction, and not its harshness, which strengthens the tissues. The process is gradual.

"If it were merely a matter of cleaning the teeth and no attention to the tissues that support them were necessary, a stiff brush would clean more rapidly than one that has fine, flexible bristles; but the investing tissues will not withstand the use of stiff brushes year after year throughout life. In special cases in which the roots are badly denuded and the septal gingivae are completely destroyed, it may be found helpful to use a brush with separated tufts of firm bristles that can be forced between the roots; but the only brush that should be used in most cases is one of medium size that has small tufts of fine bristles arranged in four parallel rows and trimmed to an even length. This is simply the old-fashioned plain brush; one that has been almost driven off the market because no one can claim it as his brush and make a profit from the sale.

It requires more time to clean the teeth with a brush that has fine, flexible bristles, but that is a distinct advantage, as the extra amount of work stimulates and strengthens the gingivae and makes them much more resistant."

Dr. Dickson Bell[2] also favors this type of brush. He wrote as follows:

"The selection of a toothbrush should be made on the basis of an analysis of what one wishes to accomplish, namely, the removal of the materia alba and food debris adhering to the surfaces of the teeth and the development and maintenance of good gingival tissue tone. The shape of the dental arch, the position, contour and size of the individual teeth are such that the bristle surface of the brush cannot be trimmed to fit the teeth. A brush that would fit the molar teeth would not be suitable in the anterior region and one that was shaped for the labial convexity in the cuspid area would certainly not fit the concavity of the arch on the lingual. In most instances, it is not possible to thoroughly brush more than two or three teeth at one time, and with the exception of the cuspid, such groups of teeth will generally conform to a straight line rather than a curved one.

"In view of these facts, it is this author's opinion that the most satisfactory type of brush is one that has flat or level trimmed bristle surface—the so-called "straight-toothbrush." It should be of medium size with a large number of bristle knots or tufts set close together and four rows in width. This gives a degree of density or body to the brush. The many bristles will cover more area of the tooth surface and thus give a better cleansing result. The bristle surface of this brush should be 1½ inches in length and ⅜ of an inch in width. However, a smaller size brush 1¼ inches in length is recommended for patients with a small mouth and for children. The bristles should be of fine texture and preferably those obtained from the wild boar since up to the present time no satisfactory brushes with nylon filaments have been manufactured. The length of the bristles should not be less than 7/16 of an inch or greater than ½ inch, depending on the type of filament to provide the correct amount of flexibility. These are important factors where the brushing procedure is chiefly in the vertical direction since short bristles or those of large diameter will not properly clean the surfaces of the teeth, but frequently traumatize the gingival tissues.

"The brushing procedure is that which was recommended some years ago by T. Sydney Smith. Patients are taught to always brush their teeth in a routine manner, beginning with the buccal surface of the last tooth on the lower left side of the arch. The dentifrice is applied to the brush, which has been previously moistened with tepid water, and placed against the buccal surfaces of the last teeth. With the mouth slightly closed to relax the cheek muscles, the handle of the brush is held in a horizontal position with the bristles at right angles to the teeth and using gentle medium strokes, the bristles are directed down over the buccal surfaces of the molars. It may also be described as a sort of sweeping motion. After a series of strokes, the brush is moved forward to the bicuspid region and the same procedure is followed, then the cuspid-lateral area, and this is continued to the last tooth on the opposite side. When it is done correctly, about six to eight brushing strokes are generally required to thoroughly clean each group of teeth.

"On the lingual surfaces of the lower molars and bicuspids, it is difficult to use this sweeping motion because of the proximity of the tongue and tissues which form the floor of the mouth. Therefore, with the handle of the brush held at a slight angle above the horizontal position, these teeth are brushed first with a downward motion and then followed by several horizontal strokes to make certain that the tooth surfaces at the gingival margin have been thoroughly cleansed. For the lingual surfaces of the lower anterior teeth, the brush is held in a vertical position and the direction of the bristle strokes is both upward and downward. The procedure of brushing the right posterior teeth is the same as that used on the left side. Heavy deposits of calculus are usually found on the lingual surfaces of the lower anterior teeth and a brush of this width will

remove the first deposits of soft material better than the average type of toothbrush. Since the brushing in this area is in a vertical direction, the extra number of bristles permits some to conform to the lingual contour of the incisor teeth, while others enter the interdental spaces and produce a stimulating reaction in the gingival tissues as they pass down over them.

"After the brushing of the lower teeth is completed, the patient is instructed to clean the brush in water and apply a fresh amount of dentifrice for the upper teeth."

It is *our* opinion that the new, soft multi-tufted brushes can be recommended to patients whose mouths have tender gingival tissues, since the patient using this brush experiences little discomfort in brushing the teeth and will use the brush longer. In fact, one of the primary reasons for the wave of popularity of this brush, we fear, is that it can be used without causing any discomfort. We have found that many patients using this type of brush do not clean their teeth well, so we believe that the soft multi-tufted brushes are indicated only in those cases where the "standard" brushes would be too harsh. In most of these cases the gingiva should be able to tolerate a stiffer brush in a few weeks, if proper periodontal treatment is instituted. We must admit these statements represent personal opinions; scientific proof of the value of the soft multi-tufted toothbrushes, when used promiscuously and haphazardly, is not available.

H. M. S. and M. K. H.

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Announcements

Winners of the Student Essay Contest of the American Academy of Periodontology 1950-51

To promote interest in periodontia among undergraduate students, The American Academy of Periodontology is sponsoring an annual essay contest. This contest is in two general parts:

1. *Local Contest in each school.* Each year the American Academy of Periodontology wishes to award a year's subscription to the Journal of Periodontology to the undergraduate student who writes the best paper on periodontia in each college. Each faculty of each college can make its own rules and regulations and select the winning paper. The winner's name should be sent to the Editor of the Journal before May 15 of each year. This year the winners are:

Baltimore College of Dental Surgery, John J. Robinson.
University of Buffalo School of Dentistry, Harry Brooks.
Creighton University School of Dentistry, Joseph C. Ranieri, Norman Olsen.
Indiana University School of Dentistry, C. B. Schimmelpfennig & George Welch.
New York University College of Dentistry, Herbert L. Kaufman.

Northwestern Univ. Dental School, Jane E. Selbe, Manual I. Weisman.
University of Pittsburgh School of Dentistry, Mathew M. McFeatters.
University of Toronto School of Dentistry, R. J. Wainright.
Washington University School of Dentistry, (St. Louis) Paul E. Jurgens.
University of Washington School of Dentistry (Seattle), Robert Duane Scott.

2. *National Contest.* Every year one paper from each school can be submitted to the Undergraduate and Postgraduate Education Committee of the American Academy of Periodontology on or before April 15. The three best papers will be awarded the following prizes:

First prize—$50
Second Prize—$30
Third Prize—$20

These papers or abstracts of them may be published in the Journal of Periodontology as the best undergraduate papers submitted in the year.

The winners of the National Contest this year are:

1st prize: "Gingival Hyperplasia in Dilantin Sodium Therapy" by Dr. Paul E. Jurgens of Washington University School of Dentistry, St. Louis. Dr. Jurgens' paper is a well organized, well documented, and well written paper that is being considered for publication in the Journal of Periodontology.

2nd prize: "The Present Status of Electro Sterilization in Dentistry" by Dr. R. J. Wainwright of the University of Toronto College of Dentistry. This paper is also being considered for publication.

3rd prize: "Comparative Healing of Mechanically and Electrically Produced Wounds" by Drs. C. B. Schimmelpfennig and George Welch of Indiana University School of Dentistry. This paper was awarded third prize because it is a well written paper dealing with some original research investigations.

In addition the Committee voted to award honorable mention to the following:

"The Role of Inflammation in Periodontal Disease Including a Review of the Morphological and Biochemical Aspects of Inflammation" by Dr. Robert Duane Stott of the University of Washington School of Dentistry, Seattle.

"Alveolar Changes in Periodontal Diseases" by Dr. Joseph C. Ranieri of Creighton University College of Dentistry.

These papers were both excellent reviews of the literature and showed much thought and preparation.

Congratulations to all of the winners!

Dr. Lawrence A. Donahoe of the Department of Periodontia, Creighton University School of Dentistry, reports he awards $12.50 to each of two seniors who have shown the most progress and interest in periodontia during their Junior and Senior years.

This year the winners are, Dr. Joseph C. Ranieri and Norman H. Olsen.

The winner of the Periodontia Staff Prize at Temple University School of Dentistry this year is Dr. Milton Klempert, 945 West State Street, Trenton, New Jersey. Each year the periodontia staff at Temple University awards a three years' subscription to the Journal of Periodontology to the student showing the most interest and achievement in periodontia: the editorial staff of the Journal believes this is a good idea!

AMERICAN ACADEMY OF PERIODONTOLOGY TO MEET IN WASHINGTON, D. C.

October 11-12-13, 1951

The 35th Annual Meeting of the American Academy of Periodontology will be held this year on October 11-12-13 in the Mayflower Hotel in Washington, D. C. An elaborate program has been planned which will be of value to all dentists who are interested in periodontology. Registration will begin Wednesday evening, October 10. Non members of the American Academy of Periodontology are invited, and all members are *expected* to attend.

Southern Academy of Periodontology

Dr. J. C. Westbrook, Jr.,
President 1950-51
Birmingham, Alabama

Dr. H. Roger Turner,
Pres.-Elect, 1950-51
Miami, Florida

Dr. S. P. Gay,
Secretary-Treasurer
Greensboro, North Carolina

The Southern Academy of Periodontology meeting was held this year May 27, 28 and 29, in the Grove Park Inn in Asheville, North Carolina with a good attendance. The program included papers by Dr. W. G. F. Schmidt of Chicago, Dr. Maynard K. Hine of Indianapolis, and Dr. Arvin W. Mann of Ft. Lauderdale, Florida. Clinics were presented by Dr. Richard Chace, Dr. L. F. Bumgardner, and Dr. J. F. Alfred. Members and guests reported they had excellent scientific sessions, with ample time remaining for sociability.

EIGHTH ANNUAL SEMINAR FOR THE STUDY AND PRACTICE OF DENTAL MEDICINE

The Eight Annual Seminar for the Study and Practice of Dental Medicine is to be held at Palm Springs, California, October 28 through November 1, and Dr. Hermann Becks, Seminar President, reports that applicants may pay one-half the fee, or $75, now to secure a place on the limited Seminar Roster. Pending approval of application, the balance of $75 may be paid any time up to October 28, 1951. Total fee of $150 includes registration, lodging and meals at the Desert Inn Hotel, which is reserved exclusively for the Seminar.

Applicants and full information on the Seminar program may be secured by writing Miss Marion G. Lewis, Executive Secretary, Room 200, Hooper Foundation, University of California Medical Center, San Francisco, 22, California.

The University of Minnesota School of Dentistry announces the Sixth Annual Seminar for the study and practice of Oral Medicine, September 20-22, 1951, to be presented through the facilities of the Center for Continuation Study.

The purpose of the seminar is to bring together men of research, teachers and practitioners in an effort to correlate the fundamental health sciences with the practice of

dentistry. Ten distinguished speakers will discuss topics related to this field. Further information may be obtained by writing to the Director of Postgraduate Dental Training, Center for Continuation Study, University of Minnesota, Minneapolis 14.

Ohio State University College of Dentistry announces the following postgraduate courses which may be of interest to periodontists to be given in the autumn of 1951:

September 24-28, Anatomy of Head and Neck, Dr. Linden F. Edwards
Oct. 29-Nov. 2, Oral Pathology, Dr. H. B. G. Robinson
December 3-7, Periodontics, Dr. John R. Wilson

Each course is given for five consecutive days, Monday through Friday, and the enrollment is limited to approximately ten per class. The fee is $50 per course.

Further information and application may be secured from the Postgraduate Division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

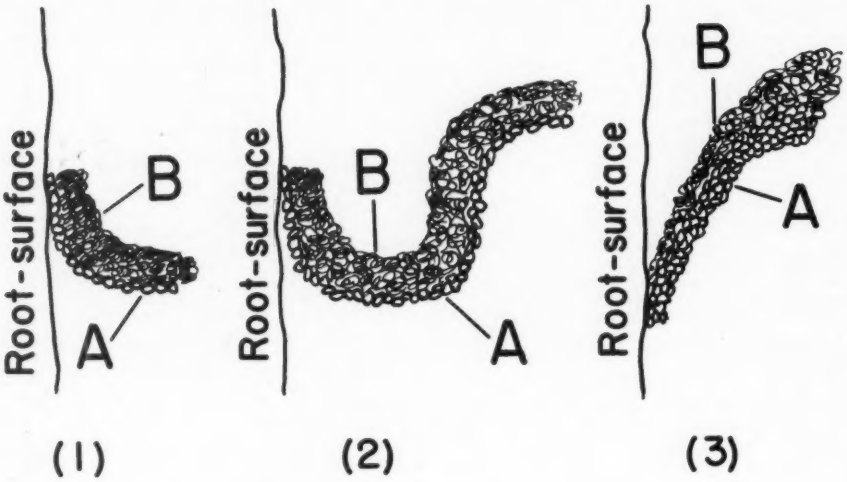
Raising the Line of Epithelial Attachment and Increasing Depth of the Clinical Root

By P. ADLER, M.D., *Debrecen, Hungary*

IT has been stated by the official discussors of the problem of raising the level of the epithelial attachment (see "In Our Opinion," Jour. of Periodont. 21:221, 1950) that it is identical with that of epithelial reattachment: whether or not —and if yes, under what conditions and at what level—reattachment may take place. There is a more fundamental problem requiring clarification first of all, viz. whether or not the so called epithelial attachment is a real union between the surface epithelium of the oral mucous membrane and the cemental surface of the root.

Generally it is taken for granted that during tooth eruption the united enamel epithelium in some form becomes fused with the epithelial layer of the oral mucous membrane. It has been shown in 1932 by *Kreiker*[1] that a union between heterotopic epithelia does in no instance take place. After transplanting oral mucous membrane into the conjunctival sac he found nodular inflammatory reactions where union between the two epithelial layers should have taken place. Histologically they display a startling similarity to what is seen around the teeth (progressive proliferation of the epithelium into the depth as a manifestation of the eliminating function of the conjunctival epithelium; similar—yet less marked—proliferation of the epithelium of the graft). I was able to show that this theory of *Kreiker* is valid for tooth eruption too by amplifying it in considering not only the homoio—and heterotopical development of the epithelia but their syn—or heterochronical differentiation too (*Adler*[2]). Several items of continuous tooth eruption can be logically explained by adapting *Kreiker's* theory—such ones too that were not explained satisfactorily formerly.

Summarily, the conclusion was drawn that in all probability there is no real union between enamel epithelium and the stratified epithelium of the oral mucous membrane. Between the two heterochronically differentiated epithelia there is physiologically a microscopic cleft. This view is



in some respect similar to that expressed in 1930 by *Skillen*.[3]

Where these two epithelia fail to fuse, the eliminating function of the epithelium becomes manifest. The surface epithelium of the gum is a well differentiated stratified epithelium with a germinative (basal) layer. In functional respect, the united enamel epithelium is to be regarded as older: it has completed its normal function by having produced enamel. Thus, it can be eliminated without causing any functional damage to the living organism. For this reason, the surface epithelium of the gum proliferates apically along the cemental surface of the root.

In what way may the stratified epithelium of the gum become united with the root surface? The union between stratified epithelium and mesodermal tissues is effected by the basal (germinative) epithelial layer. Thus, to the root surface this layer has to become attached.—This may be possible;—this would mean, however, either the non-existence of a gingival crevice or lining of the crevice (pocket) dentally and gingivally by oral epithelium (Fig. A (1) and (2)). I am not aware of anybody's having demonstrated either of these two possibilities; on the contrary, usually the reverse is seen (Fig. A (3)).

Keeping the discussed items in mind, it seems logical to conclude that there is no real union between the oral epithelium and the cementum surface of the root. This satisfactorily explains the presence of microscopic inflammation in an apparently healthy gum margin, and it is a well-known fact that in man no gingival specimen is found free of microscopical signs of inflammation.

Accepting as a matter of fact that normally no union between epithelium and cementum surface does exist, the problem of reattachment becomes a quite different one. *Gottlieb* and *Orban*[4] claim that avitality of cementum is the primary cause of apicalward proliferation of the epithelium. Neither vitality, nor loss of vitality of cementum has been demonstrated; the hypothesis is a very ingenious one since it cannot be proven by ordinary methods, and thus it can neither be disproven. Life is not bound to cellular structures; thus, the acellular marginal cementum may be, and may remain, vital, even after having been denuded for some time. I do not see any impossibility of the formation of new

periodontal fibers after proper operative procedures (elimination of infection, etc.). However, since the epithelium was not attached at any time to the root, it won't be attached after an operation either. This does not exclude the possibility of gaining clinical root length by operative procedures. The speed of apicalward growth of the epithelium depends on several factors, among others on the nutrition of the epithelium itself, of the subepithelial connective tissue, on the density and resistance of the subepithelial tissues to epithelial invasion, on nerval influences, etc. By proper operating methods, by eliminating inflammatory reactions and infections exciting inflammation one may be able to increase this resistance, and to induce the formation of new periodontal fibers inserting in a formerly denuded cementum, by new formation of cemental surface layers. Hereby from the dissection margin of the epithelium downgrowth starts again; and this start may be at a higher level than the epithelium formerly was.

If there is a contradiction between practical experience and any theory of hypothesis, the explanation of the latter is surely wrong; occasionally the theory or hypothesis is totally wrong. Both medicine and dentistry are based not on theories but on experience gathered clinically and experimentally. The hypothesis outlined briefly is in a fair accordance with clinical and experimental experience.

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4. Gottlieb, B., Orban B. and Diamond, M.: Biology and pathology of the tooth. Macmillan, 1938.

The Role of the Blood Clot in Periodontal Treatment

by C. KENNETH COLLINGS, B.S., M.A., D.D.S.,* *Houston, Texas*

IT has been common knowledge for many years that the blood clot is one of the most important aids to healing. The periodontist, in using instruments in periodontal pockets, will unavoidably produce hemorrhage which normally results in clotting. Such hemorrhage and clotting is an annoyance since it obscures the working field and must be cleared away constantly. However, the clot which forms following completion of the operative procedures should be preserved and kept in place by every means possible. It is the purpose of this discussion to reemphasize the value of the blood clot and to indicate methods for preserving it intact and in place.

When blood escapes from the blood vessels and is exposed to the air and to the action of thromboplastic substances, a thrombus or clot normally will be formed. It is not within the intended scope of this paper to discuss the details of thrombus formation. All theories on the coagulation of blood agree that the basic structure of the clot is the fibrin. Fibrin is formed as a new, chemically different, substance in the coagulum. It is found in the form of strands of protein material closely meshed to form a dense network. Its function at this stage is to hold the clotted mass together.

If blood is drawn into a test tube and allowed to clot, certain changes are easily observed. At first the thrombus appears to the unaided eye as a homogeneous dark red mass having the consistency of half-congealed jelly. But if allowed to stand for a

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few hours, the solid part of the clot will shrink in size and slowly release a pale yellow fluid in the test tube. This fluid is serum and represents the liquid part of the blood. The shrunken solid now present represents the fibrin with most of the corpuscles incorporated within its mass. The shrinkage of the clot is visible evidence of a change which is of great value in the healing of the wound. The decrease in size of the clot is caused by a shortening of the fibrin strands. These fibrin strands in a wound have a tendency to attach themselves to the walls of the injury. As they decrease in length, they pull the sides of the wound into closer relationship, which has the effect of partially closing the wound. In the subgingival curettage and open-view operation, this results in tightening the tissues around the necks of the teeth and reducing the depth of the pockets. At the same time the serum from the blood is extruded and, since this serum contains numerous antibodies and other protective substances, it has the added value of helping to defend the wound against infection. This serum, when dried, forms the hard protective "scab" found on wounds of the skin. But in wounds of the mouth, the serum is washed away and no such hard covering is formed.

Following the shrinkage and tightening of the fibrin strands, the healing process begins. Fibroblasts from the adjoining tissues migrate into the wound, probably using the fibrin strands as a support on which to travel, and begin to differentiate into connective tissue. This is followed by extensions of adjoining capillaries into the area and a new capillary bed is formed. At this stage the red, granular, glistening mass is known as granulation tissue. This is a normal healthy step in the healing process. The widespread use of the term "granulation tissue" for the diseased and necrotic debris, which is carefully removed from the sockets of abscessed teeth and from periodontal pockets, is a most unfortunate misuse of the term which should be abandoned. The granulation tissue present in healing wounds should be preserved carefully.

If reattachment of periodontal tissues to the roots of the teeth does occur, as some claim, it is quite within the realm of possibility that the organized blood clot plays an important part in the process. One valuable procedure in surgical periodontal treatment is the judicious planing of the cementum surfaces on the teeth. This is supposed to provide the most advantageous condition for encouraging the growth of new Sharpey's fibers from the cleaned cementum. If such regrowth occurs, it seems logical to assume that such fibers would become incorporated into the meshwork of fibrin and newly forming connective tissue in the gingival crevice. If such phenomenon does occur, then certainly the blood clot is essential for reattachment of soft tissues to the cementum of the tooth.

It now should be evident that the blood clot in a surgical wound is of utmost importance. In most regions of the body it is easy to protect the clot. However, in the oral cavity, the mouth fluids, which unavoidably bathe the operated areas, offer a special difficulty. All too often the clot will be literally soaked loose from its moorings or will became infected by bacteria from the saliva. It is the problem of the dentist to devise special techniques to protect this clot. To do this, it is necessary to seal the wound with some insoluble and tightly fitting dressing.

In the subgingival curettage and the open-view operation, it has been found that a periodontal varnish provides an easy and efficient means of protection. This material has the advantages of being cheap for the operator, easily and quickly applied, and forms a good moisture-resistant covering for the area. Other dressings, such as wax or adhesive tin foil, can be used. All have some disadvantages, but any one of them is better than nothing.

The formula for varnish is: gum copal,

16.0; gum mastic, 16.0; tincture of myrrh, 20.0; ether, 20.0; and collodion, 40.0.

The area to be painted is dried thoroughly and the varnish applied quickly with a cotton swab. It is allowed to dry for one minute, then gently flooded with water which sets the varnish. The patient should return in two days for a fresh application, at which time all old varnish should be removed before a new coat is applied. Patients should also be given certain directions for preserving the varnish. They should eat very soft or liquid foods. They should take no alcoholic beverages of any kind, since the varnish is somewhat soluable in alcohol, and they should not attempt to brush the varnished area. With two applications, as described, the varnish can be kept on for four or five days, which will allow the protected clot to become firmly attached and organized.

This varnish can also be used with great success in the open-view procedure. The most desirable technique is to place a suture through the interdental papilla and then varnish over the suture. If, however, a suture is not used the varnish can be used quite successfully alone to hold tissue in place. First the two parts of the interdental papilla, buccal and lingual, are tucked firmly and deeply into the interproximal space over the clot. Than a thick layer of the varnish is applied into the interproximal space, over the apposed interdental papillary tips. Care must be exercised, however, never to get any of the varnish between the contacting curetted surfaces of the interdental papilla. If this should happen, they cannot heal together, and the patient will have a buccal papilla and a lingual papilla with an indented fleshy pocket between them in the interproximal space.

In gum resections, the surgical pack will preserve the blood clot very effectively. It is wise to change this pack at intervals of approximately one week until the underlying granulation tissue has become organized into naturally colored tissue. Do not remove the pack for the final time until all signs of granulation tissue have disappeared. This will save much effort removing tissue which may try to grow back around the teeth and restore the pockets. If the pack is properly applied, there is very little opportunity for the granulation tissue to pile up. In cases in which the patient loses small areas of pack and does not have it immediately replaced, the neglected areas will show extensive regrowth of the removed tissue and the work may have to be repeated. If the layer of blood clot over the denuded bone is kept thin, but intact, the growth of granulation tissue will be accelerated but it will be restricted to the desired level.

It is incumbent upon the dentist to render his patients the very best service of which he is capable. The final result of dental treatment is often less than could be desired. This is particularly true of periodontal treatment which depends so much upon the individual response and co-operation of the patient. Even with the most careful diagnosis and treatment, some mouths fail to respond as expected. For this reason it is necessary that the careful and conscientious operator use every skill and device at his command to insure that his part of the work be of the highest order. The careful preservation of the blood clot, following operative procedures, is one more useful technique which he can use to improve the prospect of success. This clot undoubtedly functions in shrinking and tightening the free gingiva around the teeth and is an aid to healing. It should be used always as a valuable adjunct in periodontal treatment.

Suggestions and constructive criticism of Dr. Samuel R. Parks of the Dept. of Periodontology and Dr. Sol Haberman of the Dept. of Bacteriology, Baylor University College of Dentistry, are gratefully acknowledged.

REFERENCE

Goldman, Henry M.; Periodontia, 2nd Ed., (page 536) St. Louis, 1949, C. V. Mosby Co.

Abstracts of Interest to the Periodontist

Tummers, J. C.: **Electrical Burns of Mouth.** *Maandschrift von Kindergeweeskunde,* Leyden **17**: **(8)**:249. Abs. in *J.A.M.A.* **143 (13)**:1214. July 29, 1950.

Tummers reports 10 children who sustained electrical burns of the mouth, particularly of the lips, tongue and gums. The majority were between 1 and 3 years of age. Most of the electrical burns were caused by putting connecting plugs in the mouth. Excessive salivation and halitosis usually result, and oral feeding may become impossible so that fluid must be given intravenously or by rectum. In some instances feeding by nasal tube is possible. The necrotic tissue will slough after about eleven days. In some of the reported cases loss of tissue was considerable, so that speech defects resulted and plastic repair became necessary.

Pallister, R. A.: **Death from Dermatitis and Stomatitis During Streptomycin Therapy.** *British Med. Jour.* **2**:1271. Dec. 3, 1949. Abs. in *J.A.M.A.* **142 (15)**:1245. April 15, 1950.

Pallister says that when dermatitis occurs during streptomycin therapy, it is usually mild and stomatitis is rare. He reports 2 cases in which fever and lesions of the skin and mucous membranes occur during the treatment of pulmonary tuberculosis with streptomycin. The patients were men aged 25 and 28: both died. The author believes that abnormal sensitivity to streptomycin or a direct poisoning by the drug is the most probable cause of the symptoms.

Query: **Ptyalism.** *J.A.M.A.* **143 (14)**:1297. August 5, 1950.

A man of 50 developed increasing ptyalism after receiving 300,000 units of procaine penicillin in oil and beeswax, intramuscularly, for a nasal furuncle. Antihistamine drugs controlled skin reactions within six weeks. There was no previous history of allergy and he feels fine now except for anxiety and worry over the ptyalism. Physical examination is negative except for a somewhat elongated uvula. Could ptyalism be due to the penicillin and what is advised?

Ans: It is well to explore other possibilities since ptyalism as a manifestation of penicillin hypersensitivity has not been reported previously. Examination is advised for ulcer of the lower part of the aesophagus or the stomach and for pancreatic disease; special and unusual effects of any particular food and history of any factors known to be concerned with ptyalism should be explored. According to F. P. Weber, an allergic factor is important. Muscular exercise, especially soon after meals has been known to produce acute paroxysmal attacks of salivation and in some of these cases, the attack is stopped by assuming the horizontal position. Treatment may be unsatisfactory unless exciting cause can be determined.

Sharp, G. S., Demaree, E. W. and Pugh, R. E., Jr.: **Radiation versus Surgery for Cancer of the Tongue.** *West. J. Surg., Obst. & Gynecology.* **58**:271. June, 1950. Abst. in *J.A.M.A.* **144 (6)**:497. Oct. 7, 1950.

Sharp and co-workers report their experience in the treatment of 84 patients with cancer of the tongue, observed between 1932 and 1944. Lingual cancer is more malignant than other oral neoplasms; no time should be lost before the start of treatment. They believe that early recognition and treatment of the precancerous lesions would prevent 30 to 40 per cent of lingual cancers. These include, in addition to leukoplakia, such lesions as papillomas, fissures of the tongue, burns and scars from

continuous denture irritation. A good system of classification of lingual cancer is of value for prognosis and selection of treatment. The authors suggest the following classification: The first stage includes primary growths less than 1.5 cm. in diameter; the second stage, those less than 3 cm. in diameter; the third stage, primary growths of any size but with unilateral involvement of cervical nodes, permitting surgical removal; the fourth stage, primary growths with invasion of surrounding structures and inoperable cervical metastases. According to this grouping, the lesions in 29 per cent of their patients were in stages 1 and 2, and these represented 70 per cent of the total five year apparent cures. Chance of cure is about 4 times as good for a lesion in stages 1 or 2 as for one in stages 3 or 4. The five year end results demonstrate that, in the presence of involvement of the lymph nodes, the cure rate is only 17 per cent compared with 62 per cent of those without involvement of lymph nodes. The decision as to surgical intervention or radiation is determined not only by the nature of the growth but by the experience of the therapist. For the small growth 2 cm. in diameter, on the tip or border of the tongue, intraoral excision assures a brief convalescence, although deformity and impaired movement results. The removal of 2.0 cm. of normal tissue on all sides of the growth is absolutely essential. At least 75 per cent of primary healing without local recurrence can be expected in this early group of cases. Radium needles alone or in combination with roentgen therapy may produce the same results, and in the opinion of the authors, they are safer. The large middle group of primary tumors that make up stages 2 and 3 and are still limited to the boundaries of the tongue constitute a radiation problem. Radium needles and roentgen rays are the agents used for the destruction of this group. Primary healing of the lingual lesion was obtained in 4.2 per cent. The authors describe the various technics of irradiation. The stage 4 lingual cancers, which have metastasized to the cervical nodes, require a block resection of part of the tongue, jaw and cervical nodes.

Query: **Sore Tongue.** *J.A.M.A.* **144 (9)**: 812. Oct. 28, 1950.

Query concerns three patients with sore tongues for three years. Tongues are slightly swollen, dark red with deep grooves, feel stiff and sore at edges. Condition has not responded to vitamin D or dilute hydrochloric acid.

Diagnosis is probably Chronic Glossitis, a very usual condition but of very varied etiology and the three cases should be differentiated, not considered together. Also, no information is given as to teeth, gums, salivary glands, gastric acidity or dietary habits or local irritating factors and regional infections, all of which are significant. Even more likely causes are gastrointestinal abnormalities, vitamin deficiencies and allergies. Treatment would be removal of these potential agencies and administration of multi-vitamin concentrates for several months: ascorbic acid in addition to several B fractions (niacin 100-200 mg. per day orally or nicotinamide 50-100 mg. orally daily) with perhaps the addition of liver extract.

Sexton, G. B.: **Marginal Glossitis** (Meoller's). *Arch. Derm. & Syphil.* **62**:339, 1950.

Mrs. B. McF., a white woman, aged 60, had an eruption in the mouth which commenced in January 1948. Various forms of medication were utilized, including vitamin A and the B complex, ascorbic acid, penicillin, liver, various mouth washes and caustic applications. There have been intervals of quiescence and at times mild inflammation only and at other times erosive lesions. These have involved the margin of the tongue, the buccal area and the region along the line of the gums. The patient has been otherwise in good health.

Present examination reveals decidedly inflamed, erosive, tender lesions on either side of the tongue and along the margin of the gums. The blood picture was as follows: hemoglobin, 84 per cent; red blood cell

count, 3,920,000, and white blood cell count, 4,450. The blood Wassermann reaction was negative. Blood sugar was not elevated. A biopsy specimen revealed a vascular connective tissue hyperplasia quite densely infiltrated with lymphocytes, plasma cells, eosinophils and neutrophils. There was no epithelial covering on the surface and no evidence of tumor growth either of a benign or of a malignant nature.

The discussion by the various physicians attending the meeting was as follows:

The glossitis and stomatitis are due to phenolphthalein lesions in the cathartics the patient admits taking over a long period. Phenolphthalein lesions in the mouth often are painful. They often are associated with genital lesions also, particularly in males.

The lesions looked like pemphigus, but the patient had anesthesia of the cornea and pharynx, and the lesions may be factitious.

The patient when first observed presented areas in the buccal mucosa suggestive of leukoplakia, as well as the erosive inflammatory lesions seen on the marginal aspects of the gums. Vitamin A, 750,000 units daily, was administered, with complete resolution of the mucosal plaques. The possibility of artefact was considered, but so far no admission of interference has been obtained nor does there appear to be anything elicited in the history in this woman's background to suggest the diagnosis. It was of particular interest to note that phenolphthalein lesions of the mouth may be painful. The patient has been ingesting a laxative containing this drug since January 1948 but not prior to the onset of the eruption. The condition is classified only as a marginal glossitis of a possible neurogenous origin.

Lefkovits, Aaron and Lapidus, Bernard: **Hairy Tongue.** *J.A.M.A.* **143 (17)**:1482. August 26, 1950.

Lefkovits and Lapidus present an interesting discussion of black hairy tongue ("a vivid phrase applied to an extraordinary overgrowth of the filiform papillae of the tongue"). It was first eloquently described by Rogers in 1935; a series of 15 cases was reported by Swinburne (Jour. of Laryng. & Otolog., July, 1939). The authors (L. and L) report in interesting detail the case of a man of 70, including histological and bacteriological as well as local and general objective and Symptomatic conditions. They comment that black hairy tongue is most common in debilitated elderly men, in association with infections or neoplasms of the oro-pharynx, larynx and accessory sinuses. They found acute inflammation of the oro-pharynx and alpho-strep and staphy. aureus were cultured from palette and tongue, large groups of cocci being found at the periphery of all papillae. Any working explanation of mode of formation of B.h.t. must remain hypothesis since it has never been produced experimentally but the frequent association of inflammatory changes with its development suggests that any of a number of organisms are probably responsible. Infection or debility evidently permit the invasion by bacteria, yeasts or fungi. The resultant change in reaction of the papillae prevents desquamation of superficial layers of epithelium which instead remain adhered to underlying cells. Retention of successive layers of the outer hornified epithelium results in a decided overgrowth and lengthening of the papillae. Local irritants such as bad mouth hygiene and smoking probably are contributory. Two unusual cases were of patients who had smoked cigarettes which had lain on wood covered with a black hairy growth and specimens from tongues were similar to that found on the wood; also molilia albicans was found both on tongues and wood. The condition is benign but some instances have caused tickling or gagging. Treatment is improved oral hygiene, mild antiseptics and occasionally, clipping of hypertrophied papillae. Color seems dependent on chromo-genic properties of particular organisms responsible for infection.

In cases due to penicillin, filiform papillae are also involved but overgrowth is far

less pronounced than in case described and disappears on discontinuance of penicillin therapy and application of mild antiseptic solutions.

Edward Phillips: *J.A.M.A.* **143 (17)**:1514.

Observed two cases of b.h.t. due to aureomycin troches and one from the newer crystalline aureomycin.

See also abstracts, numbers 57 and 58, Jour. of Periodont. July, 1950:186-187.

Manhold, J. H., and Manhold, G. W.: **Psychosomatic Tooth Decay.** *J.A.M.A.* **142 (6)**:422. February 11, 1950.

Manhold and associates (Science Magazine—110:585, Dec. 1949); also Mellers and Herms (Jour. of Orthod. 32:301, 1946) and others, judging entirely from clinical observation, have suggested that numerous oral pathological conditions may be psychosomatic in etiology. Manhold and Manhold in order to verify these clinical findings made personality inventory tests among students, faculty and other personnel of Tufts College to compare the D.M.F. rate in those of neurotic with those of subneurotic tendencies, finding an apparently significant correlation between psychologic factors and dental caries; "but subject needs further investigation with various types and larger numbers." Using Bernreuter's personality inventory technic between introversion and extroversion scores, similar correlation was found.

Query: **Oral Aphthae.** *J.A.M.A.* **142 (12)**: 954. March 25, 1950.

Woman of 34 has had continual superficial burning ulcers along tongue margins, lips and palatine pillars for 3½ years. Journal consultant refers querist to many previous articles in J.A.M.A. on this subject (viz., Sept. 24 and Oct. 11, July 30, Dec. 31, 1949), also others before and since above dates, most of which articles may be found, abstracted in J. of Periodont. July, 1950 and elsewhere. Attention should also be called to interesting comment in J.A.M.A. Feb. 10, 1950, page 125, also abstracted in J. of Periodont.

Query: **Glossopyrosis.** *J.A.M.A.* **142 (14)**: 1116. April 8, 1950.

Married man of 38 with 3 children has complained for about four months of bitter bad taste on tongue and in mouth. Now there is decided pain and distress at tip of tongue but no visible evidence of disturbance. Pain is constant and so severe at night as to awaken him and cause insomnia. Serological tests are negative, gastric and liver function have been tested and found normal. Two abscessed teeth have been removed. No particular food seems to increase sensation. Hypodermic administration of a potent B-complex has been unsuccessful. Could worrying about his work be producing a neurosis or hysteria? What is diagnosis and treatment?

Ans.: Occurrence and symptoms are characteristic of Glossopyrosis (burning tongue). Diagnosis may have to be made on history alone. Constancy of pain rules out neuralgia of fifth nerve which would be paroxysmal. Systemic factors seem to have been ruled out presumably blood count and tonsil conditions as well as factors mentioned in the query. G. usually develops in nervous persons; it may be aggravated by local irritants. Treatment is indicated because the condition is accompanied by real and severe discomfort but any fear of cancer should be relieved and sedatives given to overcome insomnia; business worries should be corrected; all irritating foods and mouth washes, also alcohol should be banned for time being; tooth or denture irregularities should be corrected. Vitamin B concentrate and liver may be tried after result of other measures has been seen to know which has been effective.

Relief is possible and may be dramatic.

Geographic Tongue. *J.A.M.A.* **143 (9)**:858-859. July 1, 1950.

Advice is requested regarding newest procedures in treatment of Geographic Tongue of one year's duration.

Ans.: Prognosis is excellent though causes

and therapy are obscure in cases of true geographic tongue (lingua geographica; erythema migrans or wandering rash). Conditions which must be differentiated and excluded in diagnosis are the more serious lesions of tuberculosis and syphilis and neoplasms and, less serious, oral plaques of lichen planus, early leukoplakia and drug eruptions; also lesions of sprue, vitamin deficiencies and Moeller's glossitis must be ruled out. Geographic tongue shows typical irregular de-papillated red areas with raised red margins and whitish-yellow borders, recurrently, almost daily, changing. Condition is self limited, has few subjective symptoms unless irritated by food or drink, has no sequellae. Lesions are often found in anxious or tense persons, in either sex at any age and it is most desirable after definite diagnosis has been established that patient be reassured as to *non-malignancy* of geographic tongue. No constant allergic basis exists; no fungus or bacterial origin is known; a viral cause has not been proved. Treatment is nonspecific and is not urgently necessary. Various methods may then be tried, including 2 cc. capsules of dilute hydrochloric acid U.S.P. with each meal, 15 mg. riboflavin per day and 50 to 100 mg. nicotinamide per day for several weeks, all of which have effected some empiric success. The role of the newer antibiotics has not been determined.

Query: **Glossodynia.** *J.A.M.A.* **143 (14)**: 1457. August 19, 1950.

A war veteran of 27 has had beri beri and other nutritional deficiency diseases. The present complaint of glossodynia with burning sensation of tongue and mouth dates from extensive dental work done about three years ago. Is there any type of galvanometer which could dependably test and measure currents in mouth from dissimilar metals? Patient and dentist are reluctant to remove dental work unless it is shown that this is a case of Lane's disease (burning and erosion due to electrogalvanism).

Ans.: Symptoms could arise from a galvanic field although this is not common, but a metallic taste and salivation would favor this hypothesis. A galvanometer can be used to show the difference in electrical potential although it would not prove that the current causes the symptoms. An instrument may be available in a well-equipped radio repair shop. Either an R.C.A. ohmist or a Hewlett Packard 410-A voltmeter is also suitable, probably obtainable in a biophysics laboratory. Apply the stainless steel electrodes to the different metals, and a reading of .1 to 2 would be significant. In this case, wartime nutritional deficiencies could have left changes which now result in these symptoms. It is presumed that a nutritional deficiency, irritation from foods or smoking or from roughness of dentures are not present. And psychogenic causes should be eliminated.

Query: **Carcinoma of Tongue.** *J.A.M.A.* **142 (5)**: 382. Feb. 4, 1950.

Case described is of woman of 65 with extremely persistent tongue condition. It started with small ulceration five years before, which was electro-coagulated. After this patient concealed fact for four years that there remained ulceration of tongue. Now there is induration in the floor of the mouth, cervical nodes are large and pain is considerable; and condition is not improved after roentgeno-therapy externally and perorally. Condition has been declared inoperable; diagnosis epidermoid carcinoma (spindle cell) Grade III. Suggestions are requested.

Ans.: Prognosis appears hopeless; but additional external radiation may be tried, with an "air dose of about 4000 to 5000 r through a submental port" during a period not to exceed four weeks, preferably three. Metastatic lymph nodes if not included may be treated separately up to 3000 r dose in a three week interval. Good oral hygiene and even penicillin or other antibiotics, topically or parenterally often relieve some of pain and discomfort due to secondary infection. Interstitial radium or radon therapy would add to patient's discomfort and not result in cure.

Query: **Hypertrophy of Gums.** *J.A.M.A.* **143 (14)**:1298. August 5, 1950.

Man of 31 has idiopathic epilepsy. Condition can be well controlled by dilantin but this causes extreme hypertrophy of gingivae, to the extent that mesantoin or mebaral must be substituted until gums return to normal; but this therapy is much less effective than dilantin in controlling the attacks of epilepsy. What can be suggested?

Ans.: It is assumed that patient has already been advised to clean teeth and massage gums scrupulously. Larger doses of mesantoin to the point of tolerance should be tried or in combination with dilantin, to a point where overgrowth of gums does not interfere with mastication of food. Redundant tissue may be excised every few months.

Hoback, A.: **Dental Prosthesis and Intraoral Carcinomas.** *Acta Radiological*, Stockholm. **32**:249-358. October 31, 1949. Abs. *J.A.M.A.* **143 (9)**:850. July 1, 1950.

Hoback says that from 1932 to 1945 a total of 560 cases of intraoral epidermoid carcinomas were treated at the Norwegian Radium Hospital. Analysis revealed a casual connection between irritation caused by dental prostheses and the development of the carcinoma in 86 of these cases. Twelve patients had the Plummer-Vinson syndrome, which is characterized by dysphagia with glossitis, hypochromic anemia, splenomegaly and atrophy in mouth, pharynx and esophagus; it is known also as sideropenic dysphagia. The author briefly discusses the factors involved in the development of epidermoid carcinoma in the oral cavity and points out the importance of the atrophy of the mucous membrane; of the mouth in sideropenic anemia with Plummer-Vinson's syndrome and the senile atrophy of the mucous membrane: he also emphasizes these conditions as important factors in the development of carcinomas caused by the chafing of prostheses. The majority of these carcinomas develop without a demonstrable precancerous initial stage, but a number of leukoplakias have been observed; in some cases stomatitis prosthetica in the palate must be considered a precancerous condition.

Query: **Leukoplakia.** *J.A.M.A.* **142 (17)**: 1398. April 29, 1950.

What is newest therapy for oral leukoplakia?

Ans.: Many factors are thought contributory to leukoplakia and therapy is directed toward cause or causes. It is far more prevalent in males. The presence of syphilis might provide a background. Faulty hygiene, smoking, bad dental condition and dentures can be exciting irritants; also foods stimulating and irritating to the mucosa must be avoided, such as highly seasoned and very hot foods. In its incipiency much may be done to check its progress. In addition to prompt attention to above factor, vitamin A in large doses over a long period may be beneficial. Estrogen therapy has not been found helpful. If after the use of above measures the patch fails to progress or thicken, nothing more need be done except keep case under observation, since condition is sometimes a site for malignant growth. And any degenerative change should be examined histologically and treated according to findings. In the absence of malignant changes thickened areas may be removed by simple cautery; when multiple, one locality treated at a time awaiting healing of the preceding which is usually prompt and easy. In case of malignancy surgical removal with or without radiation therapy is indicated.

Query: **Periodontoclasia.** *J.A.M.A.* **143 (9)**:859. July 1, 1950.

What blood chemistry or other tests are indicated in a case of moderately severe periodontoclasia in a man aged 42? The patient in question had osteomyelitis of a femur following bone plating of a fracture 25 years ago. He has had no trouble with it for 15 years, and recent roentgenograms do not reveal any activity. There are no subjective complaints nor any physical or

systemic defects present. Information as to further studies and treatment would be appreciated.

Ans.: There is no radical new theory or treatment for periodontoclasia (pyorrhea alveolaris). It may be the end result of chronic or severe gingivitis, with infected pockets and peridental bone involvement; it may be localized or widespread and may be seen in otherwise healthy persons. There may be several stages in the development. There may be such factors as ischemia, endocrinopathy (including diabetes), the use of acid-producing foods, infection, allergy and subclinical vitamin deficiencies. No specific organism is responsible, however, and American authorities are not agreed that either food or bacterial allergy is often causative. It is improbable that an old healed osteomyelitis is related to the oral lesions, although the duration of the latter is not stated.

Blood chemical or biologic tests would not be helpful, unless a blood sugar determination is needed after urinalysis. A complete blood cell count could exclude such factors as leukopenia, anemia or polythemia. A dentist would want roentgenograms and might possibly do local bacteriologic studies, or even the guiac (Box) test for pus.

The wisest course would be to exclude any related systemic conditions and entrust the patient to a competent and interested dentist. There seems to be no special advantage in either radical surgery or cautious cautery and excision; in most cases a conservative course of pocket elimination may be tried first. Modern care would include the use of concentrates of vitamins C, B, A and D; the use of a slowly absorbed penicillin each day, especially when extraction is needed, and the continuance of oral hygiene, mouth washes and massage indefinitely after active therapy.

Query: **Inter-oral Chickenpox.** *J.A.M.A.* **143 (17)**: 1534. August 26, 1950.

Children suffer considerably with these lesions and it is recommended that 2% aqueous sol. methylrosaniline chloride (gentian violet medicinal), applied with cotton applicator. Tincture of methiolate is equally efficacious. The lesions of chickenpox are usually not numerous on mucous membranes and they rupture early and heal in two or three days.

Query: **Splitting of Lip.** *J.A.M.A.* **143 (9)**: 859. July 1, 1950.

Inquiry concerns case of persistent splitting of lips in the median line as well as at corners in man of 65. Vitamin therapy of all kinds has been unavailing. He has a generalized skin keratosis as well. He is now taking testosterone propiolate, 5 mg. sublingually, twice daily.

It is suggested that the patient may have a Chastaigne type of skin often associated with keratoses, and splitting of lips may be evidence of sensitiveness to light and avoidance of exposure to sunlight in view of patient's age and type of skin seems advisable. If splits persist, possibility of malignancy must be considered. For the perléche vitamin therapy should be continued; touching the corners with a silver nitrate stick may help. These lesions in the corner of the mouth are often aggravated by associated fungus infection. If these splits are extremely annoying, a flap, of mucous membrane from within the lip or cheek may be brought out and used to replace the affected tissue after excision of the affected vermilion border.

Blank, Harvey, Burgoon, Carroll F., Coriell, Lewis L., and Scott, T. F. McNair: **Comment on Recurrent Aphthous Ulcers.** *J.A.M.A.* **142 (6)**: 125. Feb. 11, 1950.

Above group at the University of Pennsylvania commenting on repeated statements in the J.A.M.A. and elsewhere to the effect that recurrent aphthous ulcers are caused by the virus of herpes simplex, state that *virus causation of this condition has not been proved;* and also that they were misquoted in one of the J.A.M.A. articles, in regard to an alteration in anti-

body titer in recurrent aphthous ulcer patients.

In connection with an extensive investigation of virus diseases of the skin by U. of Penn. departments of dermatology and pediatrics, carried on at the Philadelphia Children's Hospital, a study was made of primary herpetic gingivo-stomatitis, recurrent herpes simplex and recurrent ulcers of the mouth. There was included a detailed history, smear and bacteriologic culture of the ulcers, inoculation of material from lesions into embryonated eggs or rabbit's cornea, biopsy, and serologic studies for herpes simplex antibodies in blood drawn during and after acute episodes. *In none of the patients with recurrent aphthae was the virus of herpes simplex demonstrated*, by inoculation of embryonated eggs or by biopsy, methods ordinarily successful in known herpes simplex infections. Also, no herpes simplex antibodies were present at outset or during convalescence in 5 of the 13 of those tested who had recurrent aphthous ulcers. Patients with proved herpes simplex lesions, on the other hand, invariably have specific antibodies at the above periods of the disease. K. Dodd and Ruchman of Cincinnati and Jessner of N. Y. City also failed to find laboratory evidence that the virus of herpes simplex causes recurrent aphthous ulcers. Other theories have also been advanced but in most patients, cause remains obscure.

Wynder, Ernest L. and Graham, Evarts A.: **Tobacco Smoking as a Possible Etiologic Factor in Bronchiogenic Carcinoma.** *J.A.M.A.* **143 (4)**:329-336. May 27, 1950.

The results of the authors' study are based on personal interviews of 684 cases of proved bronchiogenic carcinoma since routine hospital records did not supply satisfactory answers to their questions. Other patients with lung cancers were interviewed by non-medical investigators without previous knowledge of the diagnosis; and they also questioned patients without cancer of the lungs, in general wards of various hospitals. From this carefully conducted and controlled study the authors deduced the following "Conclusion and Summary":

1. Excessive and prolonged use of tobacco, especially cigarets, seems to be an important factor in the induction of bronchiogenic carcinoma.

2. Among 605 men with bronchiogenic carcinoma, other than adenocarcinoma, 96.5 per cent were moderately heavy to chain smokers for many years, compared with 73.7 per cent among the general male hospital population without cancer. Among the cancer group 51.2 per cent were excessive or chain smokers compared to 19.1 per cent in the general hospital group without cancer.

3. The occurrence of carcinoma of the lung in a male non-smoker or minimal smoker is a rare phenomenon (2%).

4. Tobacco seems at this time to play a similar but somewhat less evident role in the induction of epidermoid and undifferentiated carcinoma in women. Among this group a greater percentage of non-smokers will be found than among the men with 10 out of 25 being non-smokers.

5. 96.1 per cent of patients with cancer of the lungs who have a history of smoking had smoked for over 20 years. Few women have smoked for such a length of time, and this is believed to be one of the reasons for the greater incidence of the disease among men today.

6. There may be a lag period of 10 years or more between the cessation of smoking tobacco and the occurrence of clinical symptoms of cancer.

7. 94.1 per cent of male patients with cancer of the lungs were found to be cigaret smokers, 4.0 per cent pipe smokers and 3.5 per cent cigar smokers. This prevalence of cigaret smoking is greater than among the general hospital population of the same age group. The greater practice of inhalation among cigaret smokers is believed to be a factor in the increased incidence of the disease.

8. The influence of tobacco on the development of adenocarcinoma seems much less than on the other types of bronchiogenic carcinoma.

9. Three independent studies have resulted in data so uniform that one may deduce the same conclusions from each of them.

Levin, Morton L., Goldstein, Hyman and Gerhardt, Paul R.: **Cancer and Tobacco Smoking.** *J.A.M.A.* **143 (4)**:336-338. May 27, 1950.

These authors believe that the literature on use of tobacco in its possible relation to cancer reveals many inconsistencies, and because of inadequate samples and other basic irregularities of research, previous studies are inconclusive. This "preliminary report" is based on the study of 1045 male cancer patients and 605 male non-cancer patients. The case histories of the present authors record date on which smoking began, duration of habit, type and daily amount of smoking as well as age and sex of smokers. Their data suggests marked causal relationship between cigaret smoking and cancer of lungs, while pipe smoking was predominantly associated with cancer of the lip. Cancer is generally considered a disease of multiple etiology, irritants being one of the factors and according to Berenblum's generalization, although not all irritants are carcinogenic all carcinogens are irritants, and capable of inducing chronic reparative hyperplasia. The same authority has shown that an irritant (the croton resin of tobacco) which is not carcinogenic alone nevertheless increases the number of tumors produced when its action is combined with that of a carcinogen. This concept in some measure explains the finding of the present report as to apparent effects of cigaret and pipe smoking.

Grace, Edwin J.: **Comment on Cancer and Tobacco Studies.** *J.A.M.A.* **143 (16)**: 1446. August 19, 1950.

Referring to two articles in the May 27th J.A.M.A. 143 (4):329-338, on cancer and tobacco, Grace comments that the above contributions represent past and present clinical approach to cancer problem but they miss interesting basic aspects of the disease. No matter how early cancer is seen clinically, it is biologically late and the philosophy of investigation must move to the basic level of the elemental cellular unit if we hope ever to effect a cure. A benzpyrene compound can readily be isolated from tobacco which applied to normal cells can alter the genetic structure so that a cancer cell is produced, according to well established genetic laws. It is most significant that such a carcinogenic compound may also act as a mutagenic compound. The two articles referred to have thus failed to emphasize that which is the heart of the problem, namely the elemental cellular unit.

Schrek, L. A., Baker, G. P., Ballard and Dolgoff, S.: **Tobacco Smoking and Cancer.** *Jr. of Cancer Research.* **10**:1-64. Jan. 1950. Abs. in *J.A.M.A.* **143 (5)**:498. June 3, 1950.

The smoking habits of 82 men with cancer of the lung and 73 men with cancer of the larynx and pharynx were compared by Schrek and his co-workers with the smoking habits of a control group of 522 patients with miscellaneous tumors. A relatively high percentage of cigaret smokers was found among the patients with cancer of the respiratory tract, as compared with the control group. This positive correlation between the incidence of cigaret smoking and the incidence of cancer of the respiratory tract appeared to be both statistically and biologically significant.

Query: **Pyorrhea and Retinal Hemorrhages.** *J.A.M.A.* **144 (14)**:1224. Dec. 2, 1950.

A 27 year old woman gives history of diabetes since age of 11. She has been on balanced diabetic diet with condition controlled by 60 units of protamine-zinc insulin daily. All of lower teeth were extracted because of "pyorrhea" and shortly after, she suffered massive hemorrhages of the right eye. There being apparently no connection between the extractions and

the hemorrhage, extraction of upper teeth was undertaken, four or five at a sitting. Then retinal hemorrhage occurred in the left eye.

Is there any explanation for these hemorrhages in a diabetic? What is the possibility of a cure once these hemorrhages have occurred?

Ans.: There is nothing to connect massive retinal hemorrhages with extraction of teeth. They could be coincidental or related to the surgical procedure in this unusual case if a general anesthetic was used. Local anesthesia would be the procedure of choice for a diabetic and a few extractions at a time. Therapy for the hemorrhages consists of good management of the diabetes, a condition in which hemorrhages are to be expected. There is always some improvement of the acute phase with absorption of the blood in the retina but a scar and impairment of vision often results. Vitamin P therapy has been attempted but not with constant success. The hemorrhagic condition is not connected with vitamin C. Prognosis is not too serious since appearance is not always progressive and may subside. But if retinitis proliferans occurs the eventual prognosis is poor.

Williams, B.: **Oral and Pharyngeal Complications of Chloramphenicol Therapy.** *Am. Practitioner and Digest of Treatment.* **1**:897. Sept. 1950. Abst. in *J.A.M.A.* **144 (17)**:1510-11. Dec. 23, 1950.

Williams directs attention to the oral and pharyngeal complications that arise during the treatment of infections with chloramphenicol. Of 200 patients receiving chloramphenicol, glossitis and black tongue, stomatitis, pharyngitis and infection of the mouth and throat developed in 12 (6 per cent) while they were being treated with the drug. The symptoms in six of these patients were so severe that therapy had to be discontinued. The patients in whom the oral and pharyngeal complications developed either were of the older age group or had chronic disease. Five of the 12 had long-standing gastrointestinal disease. The oral or pharyngeal reactions were most severe in those patients who received other antibiotics in addition to chloramphenicol. Invasion by a yeast like fungus, monilia (candida) albicans, occurred in nine patients after the bacterial flora had been suppressed by chloramphenicol. Administration of supplementary vitamins failed to prevent the development of oral and pharyngeal reactions in three patients with ulcerative colitis. Supplementary vitamins were not given to the remainder of the group with oral complications.

Lever, W. F.: **A Case for Diagnosis** (Benign Pemphigus of the Mucous Membrane). *Arch. Derm. & Syphil.* **61**:1067, 1950.

E.M.M., a 60 year old white woman, a retired school teacher, presents lesions of the mouth, conjunctivas and vagina of twenty-six years' duration. She stated that painful erosions followed by scars had been developing in these areas at irregular intervals. There had been difficulty in swallowing for twenty years, but never any hoarseness. About ten years ago there was an eruption on the sides of the neck which was diagnosed as lichen planus after the removal of a biopsy specimen. This eruption disappeared within a few months' time. For the ten years before presentation there have been occasional nontender nodular lesions on the lips which have been removed from time to time by electrodesiccation. The patient's younger sister has had an apparently similar oral and vaginal condition for the previous three years.

Examination discloses a woman of stated age who appears healthy and in no obvious distress. The most obvious changes are noted on her lips, which are covered with a layer of exuberant crusting that is 5 to 6 mm. thick. This encrustation has a firm, almost verrucous or vegetative character and extends to the vermilion borders of the lips. It is not tender when palpated. The vegetations cease on the gingival aspects of the lips, but on them there are scattered shallow erosions. The gingival, buccal and conjunctival mucosae exhibit similar small,

denuded areas. There is also scarring in the lower fornices of the conjunctivas and the buccal mucosa. Vegetations and scars limit opening of the mouth. Similar scarring is notable on the vaginal mucosa, and the introitus is so contracted as to admit but one finger.

A biopsy specimen removed from a nodule on the upper lip in December 1943 was reported to reveal squamous cell carcinoma. Other specimens of lip lesions were said to exhibit only chronic inflammation or lichen planus. The patient stated that she had received gold and sodium thiosulfate injections some years ago without benefit. No other treatment was reported. In June of 1946 an esophagoscopy was performed and revealed stenosis in the upper part of the thoracic portion of the esophagus with submucosa infiltration. No ulceration was seen.

The discussion of this case by various physicians attending this meeting was as follows:

Since the extraction of all her teeth two years ago this woman's oral condition has been worse. The tongue is smooth, with atrophy of the filiform papillae resembling the "bald" tongue of late syphilis. The chronicity of this oral disease could ultimately produce vegetating lesions as seen in this case, owing to chronic irritation and secondary infection. I do not believe that the condition is lichen planus, although the bullous type may assume some degree of chronicity. In spite of the microscopic picture suggesting lichen planus, it might be added that other chronic oral mucosal lesions may produce a cellular reaction similar to the one in that disorder. I favor the diagnosis of benign oral pemphigus with a secondary nonspecific vegetating reaction.

Peck, S. M.: **A Case for Diagnosis** (Pemphigus). *Arch. Derm. & Syphil.* **62**:349, 1950.

J.V., a woman aged 48, was studied at Mount Sinai Hospital from January to April 1948 because of alopecia areata, dermititis of the face and ears and a vesicular eruption of the mucous membranes. The cutaneous eruption was of five years' duration and has cleared up under treatment. The mucous membrane lesions are of one year's duration and persist.

Impressions during her previous admission were as follows: 1. Contact dermatitis in which sensitization played a minor role was present. 2. The causative factor reached the skin through the blood stream. 3. The oral lesions and flare following the use of antiseptics pointed either to an infection (virus or bacterial) or to an allergy of obscure type (food?). 4. A psychosomatic component was present but did not predominate.

While in the hospital the patient failed to respond to various forms of local therapy or to elimination diets. The administration of penicillin had no effect. Local application of iodochlorohydroxyquinoline (vioform) ointment, 3 per cent, helped the cutaneous eruption. The superficial ulcers of the tongue and gums failed to respond to any therapy.

The Wassermann reaction of the blood was negative. A blood count showed 12.3 Gm. of hemoglobin and 5,700 white blood cells, with a normal differential count. The erythrocyte sedimentation rate was 12 mm. per hour. Biopsy of a specimen from a vulvar lesion, performed because of pruritus, showed leukoplakia. A roentgenogram of the chest revealed a mediastinal hernia. The results of urinalysis were normal. The urea nitrogen was 13 mg. per hundred cubic centimeters. A patch test with 10 per cent nickel sulfate gave positive reactions on one occasion.

Since discharge from the hospital in April 1948 the patient has been followed in the outpatient department and has been studied by the medical, orthopedic, nose and throat, ophthalmologic and psychiatric services. At the nose and throat service it was believed that the patient might have pemphigus because of the lesions on the tongue, gums, tonsillar pillars, epiglottis and larynx.

Since Nov. 1, 1948, the patient has been taking carbarsone, 250 mg. daily for three days followed by a three day rest, and also therapeutic doses of Vitamin A, the B complex and ascorbic acid, with no effect on the lesions of the mucous membranes.

DISCUSSION

The lesions are small, sharply but irregularly circumscribed aphthous lesions of the lip, gums and tongue. Such lesions may also occur on the pharynx, larynx and esophagus. The fact that the woman has not lost any weight would also speak against pemphigus vulgaris. Dr. Curth could not detect any other classic manifestations of Behcet's disease. However, the patient may have some form of arthritis. He recommends that she be put on a restrictive diet, avoiding foods which may cause aphthous oral lesions. She should also avoid brushing her teeth, because these ulcerations follow frequent trauma.

One may have to wait and see whether she acquires additional signs, such as erythema nodosum or unspecific hypersensitivity to injections, which would speak in favor of Behcet's syndrome. Biopsy may help to differentiate the condition from pemphigus because the histologic picture in Behcet's syndrome is fairly characteristic and would show vasculitis or thrombosis of the deep vessels.

Sagarra, J. Solé, and De Olarté, L. Alonzo: **Conservative Treatment of Trigeminal Neuralgia.** *Anales De Medicina y Cirugia,* Barcelona, **Vol. 25,** Page 391. Nov. 1949. Abs. in *J.A.M.A.* **143 (9)**:850. July 1, 1950.

Solé Sagarra and Alonzo De Olarté direct attention to the causal role of irritation of the gingival end branches of the trigeminus on the development of trigeminal neuralgia and onset of the crises. The authors cite a large number of patients of either sex between the ages of 36 and 82 years in whom neuralgia had lasted from five to fifteen years. Vitamin B, roentgen therapy, nicotinic acid, bee venom and histamine iontophoresis failed to relieve their symptoms. The point of maximal pain in the majority of the cases was on either the upper or the lower gums. The differential diagnosis with the other types of neuralgia was made by the following characteristics of pain: (1) The sensitivity of the whole trigeminal territory is intact: (2) The bouts of pain are intermittent: (3) Pain is not associated with pain from other nerves. Successful treatment consisted in infiltration of the gums with a 20 per cent phenol solution in glycerin which was injected at the point of maximal pain at either or both the upper and lower gums. Neuralgia was controlled by the first infiltration in all cases. In three of six cases, neuralgia recurred one or two years after infiltration. The pain was milder than it was before the treatment. It was controlled by a second infiltration, which was given at the same point. In two cases, permanent cure was obtained from one infiltration without recurrence, two and five years, respectively, after treatment.

Shaw, Clarence: **Geographic Tongue.** *J.A.M.A.* **144 (7)**:598. Oct. 14, 1950.

The author calls attention to his article "Transitory Benign Plaques of the Tongue. Treatment with Penicillin" (Arch. Dermat. Syph. 56:110-11, July, 1947), wherein it was pointed out that rinsing mouth with a solution of penicillin, 1000 units per cubic cc. of sodium chloride solution several times a day will clear the eruption, accomplishing this in an average of four days. Although recurrences are not unusual, repetition of treatment is effective. One must bear in mind possibility of sensitizing the patient to penicillin and also the possible appearance of black hairy tongue due to changes in bacterial flora induced by the penicillin. Recently, Shaw has determined that aureomycin troches are effective in temporarily clearing the tongue lesions.

Goldman, Joel: **Reactions to Penicillin.** *J.A.M.A.* **144 (12)**:1023. Nov. 18, 1950.

A timely warning against indiscriminate

use of penicillin, as for the common cold. Two cases are cited in which patients had been treated with penicillin in previous illnesses. In one, where penicillin was afterwards administered for a cold, the following symptoms supervened: urticaria and pronounced edema of lips and mucous membrane of the mouth which latter became so extensive as to simulate gangrenous stomatitis and glossitis, with tissues of lips and mouth sloughing away. Patients may be deprived of its benefits in diseases where it is of unquestioned value, because of previous indiscriminate administration of penicillin.

Query: **Diathermy for Abscessed Teeth.** *J.A.M.A.* **144 (12)**:1046. Nov. 18, 1950.

Case is cited of patient with history of loss of sight in both eyes after treatment of sinusitis with diathermy electrodes applied over the eyes and frontal areas of skull. A naturopath had given patient six or eight treatments ten years before. Could this report be authentic?

Ans.: Diathermy has been used with but little success for the treatment of abscessed teeth, and other therapy is preferable. Diathermy may cause heating of metal fillings, though low intensity would obviate that. Blindness has been produced in dogs and monkeys by use of excessive diathermy to the eyes. Radiation results in lenticular opacities. Condition in present case is reported by patient long after diathermy was applied and in the meantime, other factors may have been involved.

Query: **Ulcers in Mouth and Throat.** *J.A.M.A.* **144 (16)**:1419. December 16, 1950.

Man of 58 gave history of having ulcers throughout mouth and throat for five months, so painful that he has had to subsist on a "diet of water, coffee and tea." Patient has no teeth, natural or artificial, does not smoke. He has general arteriosclerosis and possibly a mild cirrhosis of the liver. The following medication was given for a period of 30 days: iron and liver, B complex and other vitamins and penicillin hypodermically. He has also received full dosages of aureomycin hydrochloride and troches of chloromycetin; in addition, three smallpox vaccinations, one with a take and two without and typhoid vaccine intramuscularly which latter was followed by fever for three or four days. Under this treatment the man's weight and general condition markedly improved and he is able to eat soft bland foods, but the mouth condition remains unchanged.

Ans.: The above supportive treatment must be considered successful because of patient's general improvement although obviously not specific for the ulcers, for which careful diagnosis is the only way to arrive at correct treatment. If tuberculosis and stomatitis veneata and medicamentosa and other such entities have been excluded, diagnosis is likely either aphthous stomatitis or primary herpetic gingivostomatitis. Careful differentiation between these two conditions is essential for correct treatment. While aureomycin would be of value for herpetic stomatitis which is of virus etiology, this treatment might not be indicated for recurrent aphthous ulcers, the cause of which has not been definitely established. The querist's use of antibiotics and vaccines in this case may have been too brief and it might be well to use them again for longer periods. A series of eight smallpox vaccinations should be given at 10-day intervals regardless of whether there are takes. The querist is referred to other suggestions in former numbers of the J.A.M.A. in this section (Queries and minor notes) e.g., Feb. 7, June 12, July 10, Dec. 25, 1948; July 20, Sept. 24, Oct. 1, Dec. 24 and 31, 1949; March 25, 1950, etc.

Abstracts by C. R.

Books Received

1. O'Rourke, J. T. (edited by Miner, L. M.) Oral Physiology. St. Louis: C. V. Mosby Co., 1951. 333 pages. (Price $5)

Contents

Chapters 1 The Prevalence of Dental Disease
2 The Chief Functions of the Mouth
3 Mastication
4 Mastication in Domestic Animals
5 Mastication in Its Relation to Deglutition
6 Mastication in Its Relation to Other Parts of the Alimentary Tract
7 Taste, Smell, and Other Sensations in Relation to Mastication
8 Mastication and Its Significance in Children
9 Geriatric Relationships
10 Saliva
11 Factors Which Interfere With Normal Mastication
12 Adaptations to Deficient Masticatory Function
13 Nutritional Implications
14 The Relation of the Physical Character of the Diet to the Health of the Supporting Tissues

2. Mead, S. V. Anesthesia in Dental Surgery. St. Louis: 2d Ed. C. V. Mosby Co., 1951. 648 pages. (Price $12.50)

Contents

Chapters 1 Selection of Anesthesia
2 Anesthesia and Analgesia for Various Dental Operations
3 Teaching and Research in General Anesthesia
4 History of Local Anesthesia
5 Anatomy
6 Local Anesthesia
7 Preoperative Preparation and Medication for Local Anesthesia
8 Local Anesthetic Solutions
9 The Vehicle for Local Anesthesia
10 Armamentarium for Local Anesthesia
11 Infiltration, Terminal, or Peripheral Method of Producing Anesthesia
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